HUA HEALTH UNIT ASSOCIATION OF ALBERTA

Summary Report of the Second Alberta Dental Health Survey, 1985

A Status Report of the Dental Health of 13 year old Alberta Schoolchildren

Conducted and prepared by the Joint Long Range Planning Steering Committee of the Health Unit Association of Alberta in co-operation with:

Health Units in Alberta

Community Health Division, Alberta Social Services and Community Health

Faculty of Dentistry, University of Alberta

A copy of the complete report is available from:
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April 1986

ACKNOWLEDGEMENTS

We are pleased that the Second Alberta Dental Health Survey, 1985 has been completed. A great amount of effort was required throughout all the stages of the project and we are grateful to numerous individuals and groups.

We would like to gratefully acknowledge the generous funding of this valuable project by Alberta Social Services and Community Health.

The Dental Health Survey Committee, a sub-committee of the Health Unit Association's Joint Long Range Planning Steering Committee, worked diligently to initiate and complete the survey. We are indebted to Dr. Andre Lizaire, Dr. Gordon Thompson and Dr. Patrick Finnigan who prepared this written report. All three worked diligently throughout the course of the survey but, in particular, Dr. Lizaire, the project coordinator, must be recognized for the monumental effort put forth in managing the survey. Ms. Cathy Clement, the research assistant, is also acknowledged for all her hard work.

Much appreciation is extended to those who assisted in making this survey possible and who aided in its completion. Special mention should be made of the boards and staff members, particularly the dental hygienists and assistants, of the health units. Great assistance was also provided by the school boards and principals who were so cooperative in allowing access to the schools and the thousands of children who were examined.

Without the assistance of the above mentioned parties, this study would not have been possible and we extend our sincere appreciation to all.

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1985 ALBERTA DENTAL HEALTH SURVEY

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THE 1985 DENTAL HEALTH SURVEY

ALBERTA

Historical

In 1976 the Health Unit Association of Alberta and the Department of Social Services and Community Health established a Task Force on Dental Services. The mandate for this Task Force was to study the existing preventive dental health services offered through Health Units to suggest ways of upgrading such services and to establish minimum program standards. In the same year the Senate of the University of Alberta issued the Report of the Committee on Dental Services to Rural Areas. This Committee reported that, in the course of its investigations, it had met a wide variety of opinions from private dentists and dental health officers about the truth of the situation concerning the dental health status and treatment needs of Alberta children particularly in rural areas and that these opinions seems to vary according to location. The Committee lamented the lack of solid statistical information.

City health departments and rural health units have, since the inception of their dental programs, measured the level of dental health of the populations which they serve. However, with twenty-seven health units and little uniformity of examination criteria or dental health indices, the data gathered could not be validly compiled to reflect the dental health status of Alberta school children. It was decided therefore that in order to fulfill its mandate, the Task Force on Dental Services would first have to establish a sound dental health data base by undertaking a Province-wide survey of the dental health of Alberta school children.

The design of this survey would be based upon exacting criteria and techniques such that its results would be acceptable provincially, nationally and internationally. Such a survey, co-ordinated by Dr. Andre Lizaire of the City of Edmonton Board of Health, was carried out in 1978.

In the summer of 1979 the final report of the dental health survey was published and the Health Unit Association of Alberta then called for a report on minimum standards, manpower requirements to meet these standards and standardized methods of keeping records. A report on these matters was published in March 1982 and it included a recommendation for a replication of the 1978 survey and further, that such surveys should be carried out every five years.

In 1982 and 1983, representations to the Department were made through the Director of Dental Health Services for a commitment to fund another survey. The idea received the support of the Minister of Social Services and Community Health, but it was not until late in 1984 that a firm commitment was made to share the cost of the second survey with the Health Unit Association of Alberta. A Dental Survey Steering Committee was formed and the objectives of the second survey were:

1. To determine the changes in the dental health status of Alberta school children between 1978 and 1985.

2. To compare the dental health status of Alberta school children with that of school children in other provinces and other countries.

3. To use this information, to whatever extent it can properly be used, in a review of the impact of Provincially funded dental health programs.

4. Within the limits of the study to compare the dental health status of rural children with that of urban children and to compare the caries experience of children who have been exposed to optimal fluorides during tooth development with those who have not.

Methodology

Initially, it was the intention of the survey committee to replicate the 1978 survey. However, following the World Health Organization's recommendations, the thirteen year old population only was studied; the measurement of occlusal abnormalities was simplified and the Community Periodontal Index of Treatment Needs, measured with the new W.H.O. periodontal probe, replaced the previously used Russell Periodontal Index.

Sampling Considerations

A stratified multi-staged sampling of 13 year old Alberta students was designed (Table I). Only those students who would be thirteen years old by January 1st, 1985 and not reach their fourteenth birthday until after the conclusion of the survey examinations in May of 1985, were eligible for selection. As in the first survey, the northern, central and southern areas of Alberta, represented by the same eighteen health units, formed the initial strata with the other stratifying variables being:

TABLE I

SAMPLE DISTRIBUTION OF STUDENTS IN SELECTED ALBERTA HEALTH UNITS WHO WERE AGED THIRTEEN TO THIRTEEN YEARS SIX MONTHS AS OF JANUARY 1ST 1985

HEALTH UNIT	POPULATION 10-14 YRS NO.	%	ELIGIBLE POPULATION 13 YR OLDS NO.	%	SAMPLE EXAMINED NO.	%
ALBERTA EAST/CENTRAL	4,070	2.7	333	2.5	78	2.5
ALBERTA WEST/CENTRAL	3,490	2.3	308	2.3	74	2.4
ATHABASCA	3,010	2.0	254	1.9	31	1.0
BARONS-EUREKA-WARNER	3,040	2.0	338	2.5	71	2.3
CALGARY	42,350	28.2	3,628	26.8	836	26.8
CHINOOK	3,730	2.5	290	2.1	68	2.2
EDMONTON	34,920	23.3	3,365	24.9	798	25.6
JASPER NATIONAL PARK	180	0.1	15	0.1	2	0.1
LEDUC-STRATHCONA	9,740	6.5	892	6.6	202	6.5
LETHBRIDGE	4,120	2.8	399	2.9	84	2.7
MEDICINE HAT	5,620	3.8	541	4.0	131	4.2
MOUNT VIEW	4,460	3.0	488	3.6	120	3.8
PEACE RIVER	4,060	2.7	318	2.4	78	2.5
RED DEER	8,830	5.9	606	4.5	138	4.4
SOUTH PEACE	4,940	3.3	444	3.3	105	3.4
STURGEON	8,090	5.4	818	6.0	198	6.4
VEGREVILLE	2,100	1.4	187	1.4	46	1.5
WETOKA	3,260	2.2	303	2.2	57	1.8
	149,970	100.1	13,527	100.0	3,117	100.1

TABLE II

SAMPLE DISTRIBUTION OF SURVEY

AREA	ALBERTA POPULATION DISTRIBUTION NO.	%	SAMPLE POPULATION DISTRIBUTION NO.	%
CALGARY	645,730	27.6	836	26.8
EDMONTON	577,340	24.7	798	25.6
NON-METROPOLITAN	1,114,830	47.7	1,483	47.6
	2,337,900	100.0	3,117	100.0

1. Population areas (Table II):
   - Metropolitan - 250,000 or greater
   - Urban - 10,000 to 249,000
   - Rural - 500 to 9,999

2. Fluoride exposure:
   - greater than 0.7 mg/L
   - less than 0.7 mg/L

Within these strata school boards became the first sampling unit; schools the second and the final sampling unit was the individual student. The schools were stratified into large, medium and small in terms of the number of 13 year old students in each of them.

Table III shows the sex specificity of the total population of ten to fourteen year old students within the health unit areas studied, in comparison to the sex specificity of the sample examined.

TABLE III

SEX-SPECIFICITY OF POPULATION AND SAMPLE

	POPULATION 10-14 YRS		SAMPLE	
	NO.	%	NO.	%
FEMALE	72,860	48.6	1,566	50.2
MALE	77,110	51.4	1,551	49.8
	149,970	100.0	3,117	100.0

Sample Size

In order to obtain precision of ± 0.5 teeth, a sample size of at least 400 in each cell was required to conform with W.H.O. standards. However, 400 drawn from the fluoride and non-fluoride metropolitan, urban and rural areas gave a sample of only 2,400 which, anticipating a residency loss in the cities of Edmonton and Calgary, dictated the necessity of a larger sample being a 10% proportional sample of 13 year olds or approximately 3,600 children.

Personnel

As in the previous study, the clinical examinations were carried out by four teams each comprised of one dentist and one recording assistant. It is of interest to note that two of the examining dentists were also examiners in the first survey. Since the examiners were all staff members of health units, care was taken to ensure that none of them was allowed to examine more than 50% of the students in those areas for which they routinely take program responsibility.

Equipment

As in the first survey, the examinations were carried out using portable A-dec dental chairs, Rolux fibre-optic lights and plane #4 mouth mirrors. The explorers used were Nordent #5 and a color-coding system ensured that all were used equally and none more than twenty times. As indicated earlier, W.H.O. probes were used to measure periodontal conditions. All instruments were heat sterilized using the Driclave Model 400. Disposable examination gloves were used.

Minimization of Error

This was achieved by the following study characteristics:

1. Calibration

Using volunteer thirteen year old students who would not meet the age criteria set out in the sampling considerations above and who could not therefore be subsequently available for selection, the dental teams were calibrated for consistency and uniformity in diagnosing and recording by Dr. A.M. Hunt from the University of Toronto, during a three day period prior to field work. This calibration was made possible through the help and co-operation of the Faculty of Dentistry, University of Alberta and the Holy Cross Elementary and Junior High School in Edmonton.

2. Re-examination

Approximately one in ten of the children examined were re-examined by the same examiner. Every effort was made by the assistants to ensure that examiners could not distinguish the reliability examinations from the regular ones and this encouraged them to maintain good concentration and adherence to formal criteria.

3. Use of Four Examiners

The use of four examiners allowed for the biases from one to be countered by biases from others within the same study.

4. Sample Size

The use of a larger sample than was otherwise needed provided as generous a representation as possible from each geographical area which compensated for residency loss and also minimized random sampling error.

5. Shortened Field Time

The examinations were carried out in a period of only two months. In such a short period the examining teams had a better chance of remaining in calibration and to produce better quality data.

6. Daily Review

At the end of each day examiners reviewed record forms for completeness and accuracy of recording.

7. Fatigue Reduction

Examinations were limited to approximately thirty per day in order to reduce fatigue and enhance accuracy. The weight of equipment and supplies was also kept to a minimum.

Results

The results of the survey are very encouraging and some of the more interesting findings will be discussed here.

TABLE IV

DENTAL CARE IN LAST TWELVE MONTHS

	NO.	%
NO	823	26.3
YES	2294	73.7
	3117	100.0

Table IV shows that in the year preceding the study, greater than 70% of the children had received some form of dental care ranging from sophisticated orthodontics to routine examinations (Table V).

TABLE V

REASON FOR CARE IN LAST 12 MONTHS

REASON	NO.	%
CHECK UP	847	27.2
PROPHYLAXIS/SEALANT	441	14.1
PERIODONTICS	10	0.3
FILLINGS	350	11.2
ENDODONTICS	15	0.5
ORTHODONTICS	491	15.8
BRIDGES/CROWNS	27	0.9
EXTRACTIONS	85	2.7
OTHER (INCLUDING TRAUMA)	16	0.5
UNKNOWN	18	0.6
(EXCLUDED)	817	26.2

Table VI refers to the presence of decay or other pain-causing or potentially pain-causing conditions. Only 12 of the 3,117 children examined were in need of emergency care while 55.7% were not in need of any treatment in this category.

TABLE VI

TREATMENT FOR DECAY, TRAUMA OR OTHER POTENTIALLY PAIN-CAUSING CONDITIONS

	NO.	%
NONE	1738	55.7
DELAY	1293	41.5
IMMEDIATE	74	2.4
EMERGENCY	12	0.4
	3117	100.0

Table VII shows that fillings were required by only one third of the children examined and a similar number required orthodontic treatment. Cleaning however was deemed necessary for fifty percent of them which indicates the need for more vigorous dental health education with this age group.

Table VIII shows the type of fillings needed and it is not at all surprising to note that 81% of them are the one surface type and almost all of them will be in the pits and fissures of the six-year molars. It is known that fluorides give greater protection to the smooth surfaces of the teeth leaving the pitted and fissured biting surfaces at risk.

TABLE VII

TYPE OF TREATMENT REQUIRED

	NO.	%
PROPHYLAXIS	1588	50.9
OPERATIVE	1073	34.4
SURGERY	34	1.1
REM. PROSTH.	5	0.2
BIOPSY	2	0.1
FIXED PROSTH.	52	1.7
PERIODONTAL	12	0.4
ENDODONTICS	10	0.3
ORTHODONTICS	1132	36.3

TABLE VIII

NUMBER OF TEETH REQUIRING TREATMENT BY TYPE OF TREATMENT

TREATMENT	NO.	%
REST. - ONE SURFACE	1851	81.1
REST. - TWO SURFACES	286	12.5
REST. - THREE SURFACES	35	1.5
REST. - FOUR SURFACES	42	1.8
EXTRACTION (CARIES)	44	1.9
EXTRACTION (OTHER)	1	0.0
OTHER	24	1.0
	2283	99.8

These surfaces however could be afforded greater protection by the use of such preventive measures as pit and fissure sealants.

Table IX shows that, for the general oral health indices, there was no difference between rural, urban and metropolitan areas. However for the number of decayed missing and filled teeth, there was a gradient from 3.37 in the rural to 3.19 in the urban down to 2.90 in the metropolitan areas, which is a somewhat steeper gradient than was found in 1978. The components of the DMFT are also shown on this table, and it should be noted that the extraction of teeth because of decay (denoted by MT) has become a very rare procedure at this age. The largest component is the FT denoting filled teeth, the majority of which fillings will be in the six year molars. As noted earlier, the use of pit and fissure sealants might obviate the necessity for many of these fillings.

TABLE IX

ORAL HEALTH INDICES

INDEX	RURAL		URBAN		METROPOLITAN	
	MEAN	STAN.DEV.	MEAN	STAN.DEV.	MEAN	STAN.DEV.
CALCULUS	0.05	0.14	0.07	0.23	0.07	0.21
DEBRIS	0.83	0.50	0.86	0.55	0.81	0.51
CPITN	0.27	0.33	0.27	0.37	0.28	0.37
DMFT	3.37	2.81	3.19	2.95	2.90	2.83
DT	0.91	1.52	0.73	1.48	0.64	1.33
MT	0.05	0.30	0.03	0.27	0.02	0.22
FT	2.41	2.50	2.43	2.48	2.24	2.49

Table X presents the number of decayed, missing and filled teeth by fluoride exposure. It must be stated quite clearly however that because of the ubiquitous use of fluorides and the mobility of the studied population, it is becoming increasingly difficult to identify groups who have not been exposed to significant amounts of fluoride during the six to eight year period of permanent tooth enamel development. In this study questions were asked to determine how long the students had lived in the community where they were examined and, if less than five years, where they had lived before. These residency histories, which can be notoriously vague, were correlated with the use of fluoride supplements, fluoride rinse programs and community water fluoridation in an attempt to separate out a non-fluoride group. It will be noted from Table X that only 208 children could be so identified and, since the vast majority of households use fluoride toothpaste, even this group could not be considered completely free from fluoride exposure. Since however one of the objectives of the study was to compare the caries experience of children who had and had not been exposed to fluorides during permanent tooth development, the attempt was made. It will be noted that there is a significant difference in the total number of decayed, missing and filled teeth in the non-fluoride group compared to the fluoride groups. Of greatest interest here is the mean DMFT for the total population studied which is 3.09 as compared with 4.74 in the 1978 study. This represents a 35% decrease in the seven years between the studies which is indeed an encouraging result.

Also of interest in this table is the finding that 24% of the children have had no decay experience whatsoever in their permanent teeth compared with only 7.5% in the 1978 survey.

TABLE X

NUMBER OF DECAYED MISSING AND FILLED TEETH

AND CHILDREN WITH ZERO INCIDENCE

BY FLUORIDE LEVEL AND COMMUNITY TYPE

	DMFT				
	ATA*			ZIA+	
	N	MEAN	STAN.DEV.	NO.	%
NON-FLUORIDE	208	3.88	3.28	30	14.4
FLUORIDE	2,909	3.04	2.81	717	24.6
		SIG.(p .01)			SIG.(p .01)
TOTAL	3,117	3.09	2.85	747	24.0

*ATA: Affected Tooth Analysis.
+ZIA: Zero Incidence Analysis.

Table XI shows the examiners assessment of the number of children showing white opacities on the anterior teeth. The technique used was to dry the teeth with a sterile gauze, wait 60 seconds and then read the size of the whitened area. It was, to a greater extent than desirable, a subjective reading, but apparently more than one-half of the children examined displayed these white opacities which are most likely an indication of fluoride exposure.

TABLE XI

ANTERIOR WHITE OPACITIES

	NO.	%
ABSENT	1317	42.2
LESS THAN 0.5 MM	496	15.9
0.5 - 2 MM	634	20.3
GREATER THAN 2 MM	429	13.8
BROWN PITTING	22	0.7
(EXCLUDED)	219	7.0

Table XII shows the comparison between examiners and is an indication of the extent to which the pre-examination calibration was successful. It will be noted that significant differences exist in reading calculus (scale), debris, oral hygiene and the Community Periodontal Index of Treatment Needs (CPITN). This is probably a reflection of the subjectivity of these measurements. However, in reading the number of decayed, missing and filled teeth (DMFT), there was no examiner variation.

TABLE XII

EXAMINER COMPARISONS

EXAMINER	MEANS CALCULUS	DEBRIS	ORAL HYGIENE	CPITN	DMFT
1	0.10	1.26	1.36	0.66	3.13
2	0.11	0.48	0.59	0.08	3.13
3	0.01	0.92	0.93	0.11	2.98
4	0.02	0.61	0.63	0.26	3.12

Summary

In 1985 the second dental health survey of Alberta school children was undertaken. The results show that there has been a 35% decline in the DMFT levels during this period, that the majority of fillings are of the simple one surface type and that in this age group teeth very rarely become sufficiently decayed to need extraction. The survey also demonstrates the increasing percentage of children who have never experienced decay in their permanent teeth being 24% compared with 7.5% in 1978.

The difference in dental health between children exposed to optimal fluorides with those not so exposed is still evident but it is becoming increasingly difficult to identify a truly non-fluoride group.

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We would like to acknowledge the generous funding of this valuable project by Alberta Community and Occupational Health (formerly Alberta Social Services and Community Health).

The Dental Health Survey Committee, a sub-committee of the Health Unit Association's Joint Long Range Planning Steering Committee, worked diligently to initiate and complete the survey. We are indebted to Dr. André Lizaire and Dr. Gordon Thompson who assisted in the preparation of this written report. Both made significant contributions throughout the course of the survey but, in particular, Dr. Lizaire, the Project Coordinator, must be recognized for the monumental effort he put forth in managing the survey. Ms. Cathy Clement, Research Assistant, Ms. Alanna Bumback, Secretary, and the staff of the Dean of Dentistry's office, are also acknowledged for all their hard work and patience.

Much appreciation is extended to those individuals and groups who made this survey possible and who aided in its completion. Special mention should be made of the boards and staff members, particularly the dental hygienists and assistants, of the health units. Great assistance was also provided by the school boards and principals who were so cooperative in allowing access to the schools and the thousands of children who were examined.

Without the invaluable support of the above mentioned parties, this study would have not been possible and we extend our sincere appreciation to all.

Jean DeChamplain
Chairman, Health Unit
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Patrick Finnigan
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1985 ALBERTA DENTAL HEALTH SURVEY

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Summary

In 1985, the second dental health survey of Alberta school children was completed. A total of 3,117 thirteen year old students was examined from an initial sample of 3,600. A stratified multi-staged sampling technique was used which took into account geographic, socio-economic, fluoridated and non-fluoridated environments together with rural, urban and metropolitan population areas. The examinations were carried out by four dentists who, with their assistants, had undergone pre-survey calibration. The examination criteria were those developed by the World Health Organization.

The results of the survey show that there has been a decline of some 35% in the number of decayed, missing and filled teeth (DMFT) in the thirteen year old population since the first survey in 1978. Because of the ubiquitous use of fluorides, it was difficult to identify a large number of children who could be considered to have lived in a fluoride-free environment. However the 208 children who were so identified showed a DMFT which was 27% higher than that of the fluoride group.

Some differences were noted in the DMFT indices between rural and metropolitan areas with the latter being in somewhat better shape. In all areas, the preponderance of carious lesions were of the simple pit and fissure type which indicates a far greater need for both the public and private sectors of dentistry to make sealants the treatment of choice. The number of students who exhibited no decay experience whatsoever in their permanent teeth was 24% compared to only 7.5% in the 1978 survey.

The most common reasons for seeking care in the year preceding the survey were for routine checks and cleaning, which together with orthodontic care were also the most common treatment needs found by the examiners. Only 12 of the 3,117 children examined were in need of emergency care.

The periodontal condition of the students was fair, but the mean debris index illustrated the need for more enthusiastic use of the toothbrush.

There was evidence of very mild mottling in about half of the children examined, but only in twenty-two of them could the mottling have been considered an aesthetic problem. Unsightly mottling almost exclusively results from the drinking of well water when such water is unacceptably high in natural fluorides. In Alberta, natural fluoride ranges from 0.1 to 4.5 ppm (C.P.H.A. 1979).

The results of the pre-survey calibration sessions were astoundingly successful which was illustrated by the ability of the four examiners to remain consistent in their reading of the DMFT index.

Finally the study did, to the largest extent, allow for the meeting of its four stated objectives (page 5).

Historical

In 1976 the Health Unit Association of Alberta and the Department of Social Services and Community Health established a Task Force on Dental Services the mandate for which was to study the existing preventive dental health services offered through Local Health Authorities (L.H.A.'s), to suggest ways of upgrading such services and to establish minimum program standards. In the same year the Senate of the University of Alberta issued the Report of the Committee on Dental Services to Rural Areas. This Committee reported that, in the course of its investigations, it had met a wide variety of opinions from private dentists and dental health officers about the truth of the situation concerning the dental health status and treatment needs of Alberta children particularly in rural areas and that these opinions seems to vary according to location. The Committee lamented the lack of solid statistical information.

City health departments and rural health units have, since the inception of their dental programs, measured the level of dental health of the populations which they serve, but with some twenty-seven health units and little uniformity of examination criteria or dental health indices, the data gathered could not be validly compiled to reflect the dental health status of Alberta school children. It was decided therefore that in order to fulfill its

mandate, the Task Force on Dental Services would first have to establish a sound dental health data base by undertaking a Province-wide survey of the dental health of Alberta school children, the design of which survey being based upon exacting criteria and techniques such that its results would be acceptable provincially, nationally and internationally. Such a survey, co-ordinated by Dr. André Lizaire of the City of Edmonton Board of Health, was carried out in 1978.

In the summer of 1979 the final report of the dental health survey was published (Stamm, Lizaire, et al, 1979) and the Health Unit Association then called for a report on minimum standards, manpower requirements to meet those standards and standardized methods of keeping records. A report on these matters was published in March 1982 and it included a recommendation for a replication of the 1978 survey and a further recommendation that such surveys should be carried out every five years.

In 1982 and 1983, representations to the Department were made through the Director of Dental Health Services for a commitment to fund another survey. The idea received the support of the Minister of Social Services and Community Health, but it was not until late in 1984 that a firm commitment was made to share the cost of the second survey with the Health Unit Association of Alberta. A Dental Survey Steering Committee was formed and the objectives of the second survey were accepted as follows:

1. To determine the changes in the dental health status of Alberta school children between 1978 and 1985.

2. To compare the dental health status of Alberta school children with that of school children in other provinces and other countries

3. To use this information, to whatever extent it can properly be used, in a review of the impact of Provincially funded dental health programs.

4. Within the limits of the study to compare the dental health status of rural children with that of urban children and to compare the caries experience of children who have been exposed to optimal fluorides during tooth development with those who have not.

Study Design

Initially it was intended to replicate the 1978 survey in which the children in the 6-7 and 13-14 year old age groups were examined. However, a decision was made not to examine the younger age group and to limit the older age group to children who were 13 years old at the time of examination. The following points were considered in making this decision:

1. The age group chosen reflects W.H.O. criteria for such studies.

2. The significance of treatment levels and treatment needs in the deciduous component of the mixed dentition is open to misinterpretation.

3. Decay levels in the deciduous dentition can appear artificially high when caries must be recorded on teeth about to be exfoliated.

4. Evidence of fluorosis is more accurately read on the permanent teeth.

5. The cost of the study can be significantly reduced by examining one age group thus obviating - in the majority of situations - the necessity for visiting and setting up in more than one school in the smaller communities.

TABLE I

DENTAL HEALTH SURVEY SAMPLE DISTRIBUTION OF THIRTEEN YEAR OLDS*

AMONG ALBERTA HEALTH UNITS

HEALTH UNIT	POPULATION¶ 10-14 yrs. NO.	%	POPULATION§ 13 yr. olds NO.	%	POPULATION EXPECTED NO.	SAMPLE EXAM'D NO.	%
ALBERTA EAST/CENTRAL	4,070	2.7	333	2.5	90	78	2.5
ALBERTA WEST/CENTRAL	3,490	2.3	308	2.3	83	74	2.4
ATHABASCA	3,010	2.0	254	1.9	68	31	1.0
BARONS-EUREKA-WARNER	3,040	2.0	338	2.5	90	71	2.3
CALGARY**	42,350	28.2	3,628	26.8	965	836	26.8
CHINOOK	3,730	2.5	290	2.1	76	68	2.2
EDMONTON¶¶	34,920	23.3	3,365	24.9	896	798	25.6
JASPER NATIONAL PARK	180	0.1	15	0.1	4	2	0.1
LEDUC-STRATHCONA	9,740	6.5	892	6.6	238	202	6.5
LETHBRIDGE	4,120	2.8	399	2.9	104	84	2.7
MEDICINE HAT	5,620	3.8	541	4.0	144	131	4.2
MOUNT VIEW	4,460	3.0	488	3.6	130	120	3.8
PEACE RIVER	4,060	2.7	318	2.4	86	78	2.5
RED DEER	8,830	5.9	606	4.5	162	138	4.4
SOUTH PEACE	4,940	3.3	444	3.3	119	105	3.4
STURGEON	8,090	5.4	818	6.0	216	198	6.4
VEGREVILLE	2,100	1.4	187	1.4	50	46	1.5
WETOKA	3,260	2.2	303	2.2	79	57	1.8
	149,970	100.1	13,527	100.0	3,600	3,117	100.1

* For sampling purposes the students had to be 13 to 13 years and 6 months as of January 1, 1985. For that, each child's date of birth had to fall between July 1, 1971 and January 1, 1972, inclusive. That interpretation was in agreement with the Population Research Laboratory at the University of Alberta and the Canada Census.

¶ Alberta Bureau of Statistics, 1985 estimates (1985 01 01).

§ School Enrollment Statistics (1984-85 School Year) from School Boards personnel in the Health Units involved.

** Excluding area TIY (193) for lack of SES information.

¶¶ Excluding Winterburn Public School (25) for lack of SES information.

Sampling Considerations

A stratifed multi-staged sampling of 13 year old Alberta students was designed (Table I). Only those students who would be thirteen years old by January 1, 1985 and not reach their fourteenth birthday before the conclusion of the survey examinations in May of 1985, were eligible for selection. As in the first survey, the northern, central and southern areas of Alberta, represented by the same eighteen local health authorities, formed the initial strata with the other stratifying variables being:

1. Population areas

   - Metropolitan - 250,000 or greater
   - Urban - 10,000 to 249,000
   - Rural - 500 to 9,999

2. Fluoride exposure:

   - greater than 0.7 mg/L
   - less than 0.7 mg/L

Table II shows the percentage distribution of the final sample to be the same as the percentage distribution of Alberta's metropolitan and non-metropolitan areas.

TABLE II

SAMPLE DISTRIBUTION OF SURVEY

AREA	ALBERTA POPULATION DISTRIBUTION NO.	%	SAMPLE POPULATION DISTRIBUTION NO.	%
CALGARY	645,730	27.6	836	26.8
EDMONTON	577,340	24.7	798	25.6
NON-METROPOLITAN	1,114,830	47.7	1,483	47.6
	2,337,900	100.0	3,117	100.0

Within these strata, school boards became the first sampling unit; schools the second and the final sampling unit was the individual student.

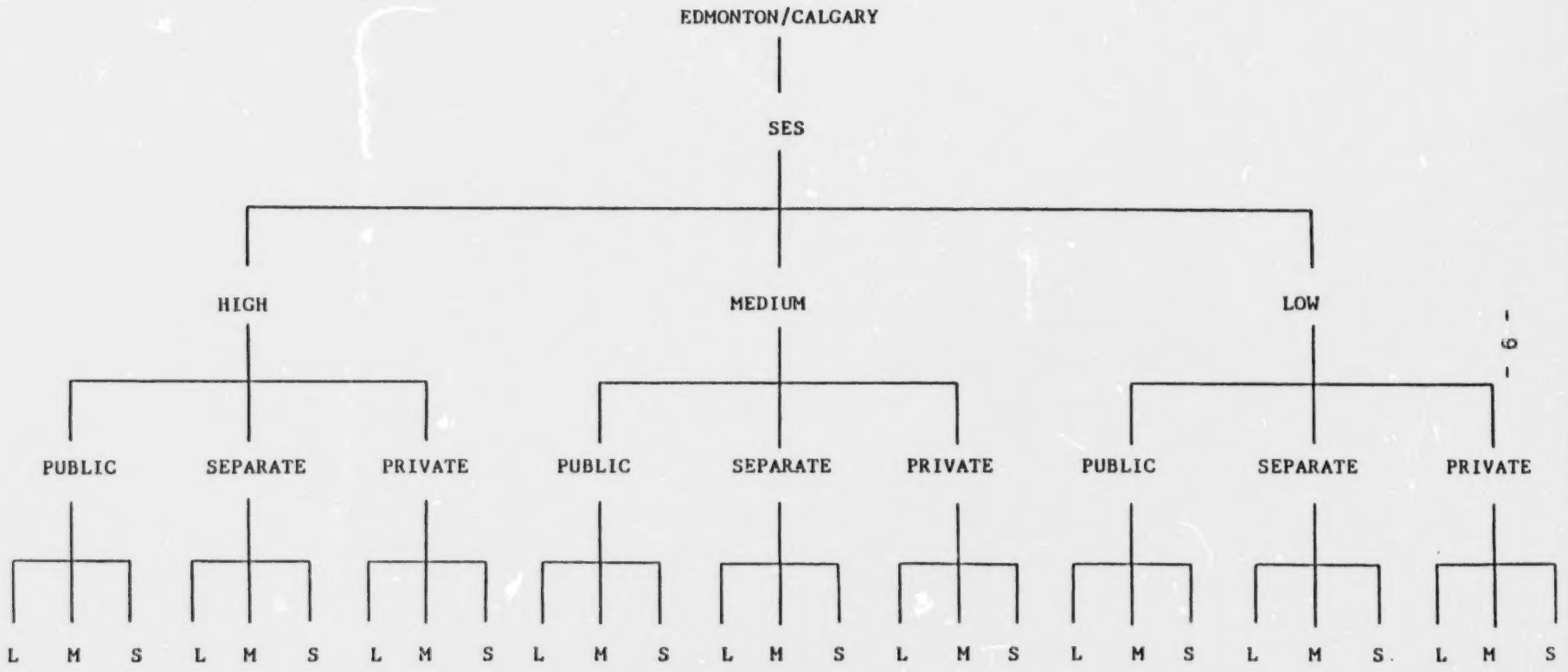
In order to ensure a representative sample, the population in in each metropolitan area was divided into high, medium or low socio-economic status (SES) on the basis of the number of persons per thousand in receipt of social assistance. From this stratum, schools were then selected as being Public, Separate or Private and then further stratified to get representation from large, medium and small schools. School size was determined on the basis of the number of registered 13 year old students. Table III illustrates this stratification.

In the non-metropolitan areas, it was not necessary to stratify on the basis of socio-economic status since, in most cases, rural and urban area schools are centralized. These schools were, however, stratified on the basis of urban and rural as defined earlier and then into areas designated as fluoride and non-fluoride. A fluoride area (F+) was defined as having equal to or greater than 0.7 mg/L of fluoride in the community water supply or a rinse supplement program available to students up to and past the age of 13 years. A fluoride deficient area (F-) was defined as one in which the community water supply contained less than 0.7 mg/L fluoride and an area with no rinse or supplement program available to students after the age of 8 years.

The third stratum for the non-metropolitan areas was school size with only large and small being designated. Table IV illustrates the characteristics of the sampling plan for the non-metropolitan areas.

TABLE III

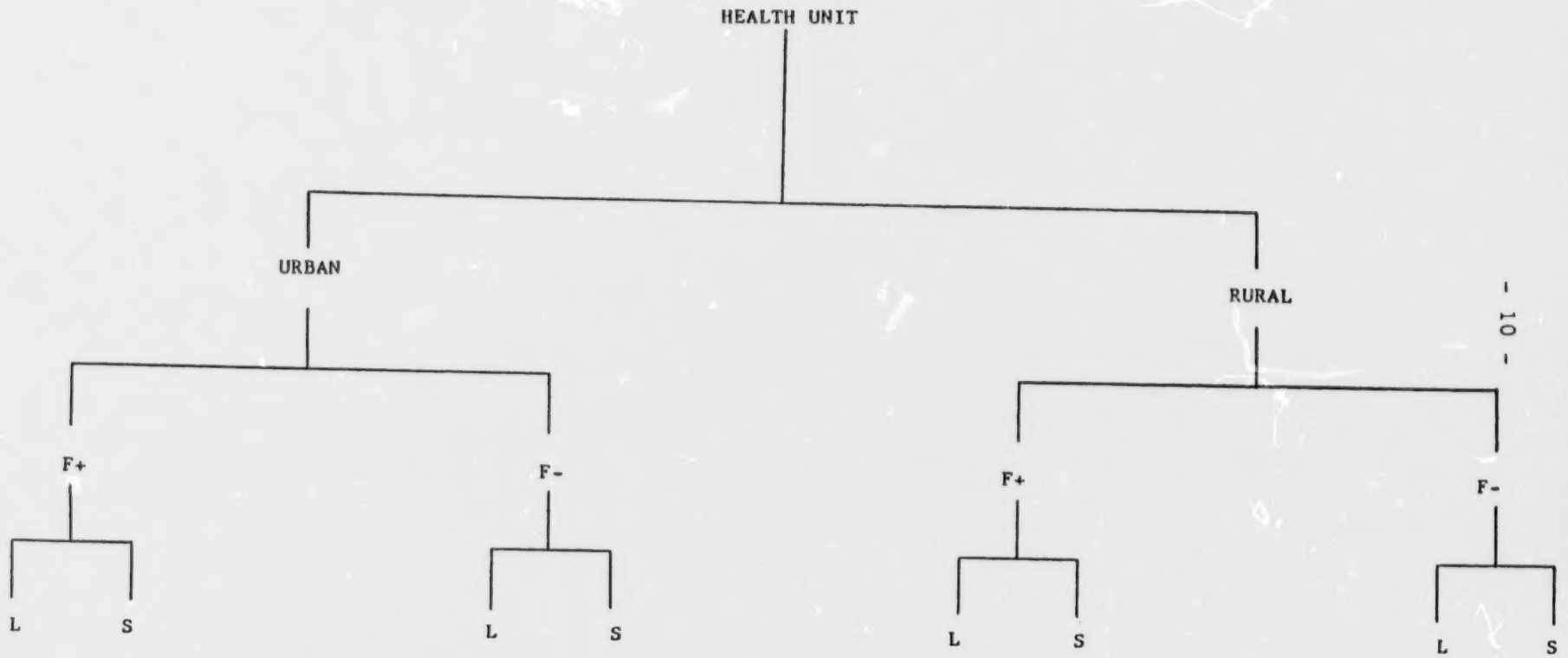
SAMPLING PLAN FOR METRO AREAS (≥ 250,000)



- HIGH SES : < 13/1,000; MEDIUM SES ; 13-28/1,000; LOW SES : > 23/1,000
- LARGE SCHOOL: > 50 ; MEDIUM SCHOOL; 10-50 ; SMALL SCHOOL: < 10

SAMPLING PLAN FOR NON-METRO AREAS (< 249,000)

TABLE IV



- URBAN AREA : 10,000-249,000; RURAL AREA : 500-9,999
- LARGE SCHOOL: >10 ; SMALL SCHOOL: ≤10

Table V shows the sex specificity of the total population of ten to fourteen year old students within the health unit areas compared to that of the population sampled.

TABLE V

SEX-SPECIFICITY OF POPULATION AND SAMPLE

	POPULATION 10-14 YRS. NO.	%	SAMPLE NO.	%
FEMALE	72,860	48.6	1,566	50.2
MALE	77,110	51.4	1,551	49.8
	149,970	100.0	3,117	100.0

Sample Size

In order to obtain precision of ± 0.5 DMF teeth, a sample size of at least 400 in each cell was required to conform with W.H.O. standards. However, 400 drawn from the fluoride and non-fluoride metropolitan, urban and rural areas gave a sample of only 2,400 which, anticipating a residency loss in the cities of Edmonton and Calgary, dictated the necessity of a larger sample being a 10% proportional sample of 13 year olds or approximately 3,600 children.

Personnel

As in the previous study, the clinical examinations were carried out by four teams each comprised of one dentist and one recording assistant. It is of interest to note that two of the examining dentists were also examiners in the first survey. Since the examiners were all

staff members of local health authorities, care was taken to ensure that none of them was allowed to examine more than 50% of the students in those areas for which they routinely take program responsibility.

Equipment

As in the first survey, the examinations were carried out using portable A-dec dental chairs, Rolux fibre-optic lights and plane #4 mouth mirrors. The explorers used were Nordent #5 and a color-coding system ensured that all were used equally and none more than twenty times.

W.H.O. probes , a description of which appears on page 15, were used to measure periodontal conditions. All instruments were heat sterilized using the Driclave Model 400. Disposable Examination gloves were used.

Minimization of Error

This was achieved by the following study characteristics:

1. Calibration

Using volunteer thirteen year old students who would not meet the age criteria set out in the sampling considerations above and who could not therefore be subsequently available for selection, the dental teams were calibrated for consistency and uniformity in diagnosing and recording by Dr. A.M. Hunt from the University of Toronto, during a three day period prior to field work. This calibration was made possible through the help and co-operation of the Faculty of Dentistry, University of Alberta and the Holy Cross Elementary and Junior High School in Edmonton.

2. Re-examination

Approximately one in ten of the children examined were re-examined by the same examiner. Every effort was made by the assistants to ensure that examiners could not distinguish the reliability examinations from the regular ones and this encouraged them to maintain good concentration and adherence to formal criteria.

3. Use of Four Examiners

The use of four examiners allowed for the bias from one to be countered by biases from others within the same study.

4. Sample Size

The use of a larger sample than was otherwise needed provided as generous a representation as possible from each geographical area which compensated for residency loss and also minimized random sampling error.

5. Shortened Field Time

The examinations were carried out in a period of only two months. In such a short period the examining teams had a better chance of remaining in calibration and to produce better quality data.

6. Daily Review

At the end of each day examiners reviewed record forms for completeness and accuracy of recording.

7. Fatigue Reduction

Examinations were limited to approximately thirty per day in order to reduce fatigue and enhance accuracy. The weight of equipment and supplies was also kept to a minimum.

The Examination

The recording form for the 1985 survey, a copy of which appears as Appendix A to this report, differed little from the 1978 recording form except in the method of reading and recording periodontal disease and orthodontic status.

Under Personal and Demographic Information, the question regarding the father's occupation was asked with caution, and the recorder had to be ready to re-phrase the question to reflect the increasing number of single parent families. It might be necessary, in future surveys, to reconsider the inclusion of this question. The answers to the question on residence history were, in more cases than desirable, a co-operative effort between student and recorder.

Under Service Utilization, the average thirteen year old, often had difficulty remembering when he last saw the dentist or for what reason. The questions concerning the student's own opinion of his oral status could well be eliminated without detracting from the study.

Section G of the recording form used the Community Periodontal Index of Treatment Needs (CPITN) in place of the Modified Russell Index used in 1978.

The CPITN resulted from the initiative of the Oral Health Unit of the World Health Organization who, in 1977, organized experts from fourteen countries to advise on the cause, prevalence and prevention

of periodontal diseases. After extensive field trials and modifications, the index which is designed to assess periodontal treatment needs rather than the periodontal status, was based upon the examination of six segments being the upper and lower right and left posterior, together with the upper and lower anterior segments. (Ainamo, J. et al, 1982)

Within these segments or "sextants", ten index teeth have been designated for examination and hence the index is based upon a partial recording. Although all ten index teeth must be examined, only the severest condition per sextant is recorded.

The CPITN examination utilizes the special W.H.O. periodontal probe available from the J. Morita Corporation of Japan.

This probe was designed to measure pocket depth and to detect subgingival calculus. It is a very light weight instrument with a ball tip for easier detection of calculus and color coded between the 3.5 mm and 5.5 mm area for rapid reading of pocket depth.

For the recording of dental caries, the criteria used were those described in the W.H.O./D.D. International Collaborative Study of Dental Manpower Systems in Relation To Oral Health Status and in the second edition of the W.H.O. publication Oral Health Surveys - Basic Methods.

Some modifications were made to the criteria described in these publications and the protocol used is included as Appendix B to this report. During the calibration period, it was thought that examiners

were spending a little too long searching for elusive cavities. For this reason, the aphorism, "If it is taking that long to find, it isn't there," was added under the caries diagnosis criteria.

The question of recording the presence of sealants was discussed by the survey committee. Although this preventive measure has been in fairly common use for more than ten years, dental epidemiologists have not yet decided upon their place in survey statistics. If only completely sound teeth have been sealed then no problem exists; if however, teeth with incipient caries have, or are now being sealed, then perhaps a survey data comparison problem does exist. Furthermore, the presence of the transparent type sealant is not always easily detected. Although the survey record sheet (Appendix A) shows in Section H, a code "Z" for recording sealants, it was not used in this survey. All sealed teeth, which were otherwise sound, were marked Code "S" indicating caries-free status.

Another major change from the 1978 survey was in the reading of the students' orthodontic status. In the earlier survey, the molar relationship together with fourteen other space and occlusal recordings were made. In this survey, only the molar relationship was read.

Because of the widespread use of fluorides in its many vehicles, more attention was paid in the survey to the presence of white opacities. The upper left central was dried with a sterile gauze and, after waiting one full minute, the extent of the opacity was rated on a scale of 0 to 4. It is recognized that not all white opacities are the result of fluoride ingestion during amelogenesis. Indeed the

literature on this subject shows a very great need for further research into their etiology, the reading of which can no longer be based alone upon Dean's classification. (Thylstrup, A. et al, 1978)

Results and Discussion

Dental Care - When and Why

Table VI shows that over 70% of the children examined had received some form of dental treatment in the year preceding the study.

TABLE VI

DENTAL CARE IN LAST TWELVE MONTHS

	NO.	%
NO	823	26.3
YES	2,294	73.7

Table VII shows the primary reasons for seeking care during the twelve month period. It is interesting to note that 41% of the visits to the dentist during the year were for preventive services: i.e. check-up, prophylaxis and sealants. Also of great interest is that the number of students seeking orthodontic treatment exceeded the number seeking restorations (fillings) - a clear indication of

the changing patterns in dental health brought about by the success of preventive approach.

TABLE VII

PRIMARY REASON FOR CARE IN LAST 12 MONTHS

PRIMARY REASON	NO.	%
CHECK UP	847	27.2
ORTHODONTICS	491	15.8
PROPHYLAXIS/SEALANT	441	14.1
FILLINGS	350	11.2
EXTRACTIONS	85	2.7
BRIDGES/CROWNS	27	0.9
ENDODONTICS	15	0.5
PERIODONTICS	10	0.3
OTHER (INCLUDING TRAUMA)	16	0.5
UNKNOWN	18	0.6
(EXCLUDED)	817	26.2
	3,117	100.0

Students' Assessment of Dental Health

The students' knowledge of their own immediate dental health is of passing interest only. Seventy percent considered themselves not to have anything wrong with their teeth or gums (Table VIII).

TABLE VIII

CLASSIFICATION BY WHETHER A DENTAL PROBLEM EXISTS AND IF CHILD WANTED TO SEE A DENTIST

	PROBLEM NO.	%	VISIT WANTED NO.	%
YES	929	29.8	742	23.8
NO	2,188	70.2	2,375	76.2
	3,117	100.0	3,117	100.0

Since the majority would have been unaware of the minor periodontal problems that existed, this percentage approximates the 65.4% of students who had no dental caries or had received treatment for dental caries (Table XXI, page 34).

Number of Teeth Present

The emphasis of the survey examination was on the permanent dentition, however the average number of deciduous teeth present was 0.45 and 26.57 permanent teeth. There is nothing notable about this finding (Table IX).

TABLE IX

MEAN NUMBER OF TEETH PRESENT

TEETH	MEAN	STAND.DEV.
DECIDUOUS	0.45	1.37
PERMANENT	26.57	2.48

Non-Carious Missing Teeth

Table X shows that 8.5% of the children examined had undergone extraction of teeth to alleviate crowding.

TABLE X

NON-CARIOUS MISSING TEETH

	NO.	%
NONE	2,459	78.9
ORTHODONTICS	264	8.5
TRAUMA - SPORTS	6	0.2
TRAUMA - OTHER	1	0.0
CONGENITALLY	59	1.9
OTHER/COMBINATION	4	0.1
(EXCLUDED)	324	10.4
	3,117	100.0

On surveys with this age group, there is usually little, if any doubt whatsoever about the reason for such non-carious missing teeth since the examiner's clinical judgement can, in almost every instance, be confirmed by the student. What is of particular interest now, however, is that in 1978, 16%, or twice as many, of the 13 to 14 year old age group had had non-carious teeth removed for orthodontic purposes. It could be that this difference exists because 44% of the 1978 group were 14 years old; on the other hand, it is interesting to speculate on whether or not the reduced percentage having orthodontic extractions is indicative of the "new-wave" orthodontics.

Orthodontic Appliances Present

Table XI shows the percentage of children examined who were or had previously worn orthodontic appliances.

TABLE XI

ORTHODONTIC APPLIANCES PRESENT

	NO.	%
NONE	2,680	86.0
UNILATERIAL SPACE REGAINER	13	0.4
BILATERIAL SPACE REGAINER	14	0.5
ANTERIOR CROSSBITE APPLIANCE	2	0.0
ARCH EXPANSION APPLIANCE	23	0.7
CRIB	1	0.0
EXTRA-ORAL RETAINER	8	0.3
FULL BANDING	221	7.1
FULL BANDING PREVIOUSLY	30	1.0
OTHER	125	4.0
	3,117	100.0

Data such as these are useful indicators of changing trends in the public's attitude towards their dental needs, most particularly when the 14% of children wearing some type of orthodontic appliance is compared to the 7.5% wearing such appliances in 1978. However, two observations must be made. Although the appliance categories in 1985 are the same as those used in the 1978 survey, in the seven intervening years there has been a great increase in the use of the non-specialist fitted appliances and secondly, the form and complexity of some of the new appliances very often defied the examiners' ability to categorize them on the functional basis required.

Pain and Potentially Pain Causing Conditions

Table XII is included here but only the last two categories of immediate and emergency conditions should be considered since a late change in coding for the second category was not clearly understood. However, the figure of 12 or 0.4% of the students examined being in need of emergency treatment - i.e. needed on the day of examination, was uniformly recorded. The criteria used in gathering data for this table does not allow it to be compared with the 1978 data.

TABLE XII

TREATMENT FOR DECAY, TRAUMA OR OTHER POTENTIALLY PAIN-CAUSING CONDITIONS

	NO.	%
NONE	1,738	55.7
DELAY	1,293	41.5
IMMEDIATE	74	2.4
EMERGENCY	12	0.4
	3,117	100.0

Anterior White Opacities

Table XIII shows that more than half of the students examined showed evidence of anterior white opacities on an upper central incisor. It was stated earlier in this report that further research on the etiology of white opacities is needed. Furthermore, consi-

dering the literature on the subject, it might be concluded that the central incisor should not be the tooth of choice in reading fluorosis.

TABLE XIII

ANTERIOR WHITE OPACITIES

	NO.	%
ABSENT	1,317	42.2
LESS THAN 0.5 MM	496	15.9
0.5 - 2 MM	634	20.3
GREATER THAN 2 MM	429	13.8
BROWN PITTING	22	0.7
(EXCLUDED)	219	7.0
	3,117	100.0

In a Liverpool study (Jackson, D. 1961), it was concluded that "the relatively high incidence of mottling in the maxillary central incisor tooth, found in both children and adults, suggests a local cause which may be traumatic injury to the deciduous predecesors". In another Liverpool study (Goward, P. E. 1976) in which maxillary and mandibular incisors were used as the index teeth, the data suggested "that mottling is of multifactorial origin with systemic, local and possibly genetic factors involved". In a Swedish study (Holm, A. K., Andersson, R. 1982) concluded that "thirty percent of the recorded localized opacities and/or hypoplasias could be related to an earlier trauma in the primary dentition". To add a

little more confusion to the scene, it has been found (Butler, W., et al, 1985) that "in addition to the level of fluoride in drinking water and mean maximum temperature, total dissolved solids, zinc, race and presence of air conditioning" to be related to the prevalence of mottling.

From the foregoing, it will be recognized that drawing conclusions from the survey findings on white opacities is fraught with danger. It is however of interest to note that, after removing the exclusions from the table, 54% of the remainder showed white opacities compared to only 26% in 1978. None of these opacities, with the exception of an insignificant proportion of brown mottling, was unsightly.

Periodontal Conditions

Three measurements were made relative to the students' periodontal condition - the Debris Index, the Calculus Index and the Community Periodontal Index of Treatment Needs (CPITN).

For the Debris Index, six surfaces were examined being the buccal surfaces of the upper six year molars, the lingual surfaces of the lower six year molars together with the labial surfaces of an upper and lower central incisor. The examination was made by assessing the extent of the debris from the occlusal to the gingival margin. Possible scores were from 0 to 3. A score of 1 indicated that debris covered one third or less of the surface. (See Appendix B). The same surfaces were read for the Calculus Index and a similar

scoring range was used. An examination of Table XIV shows that the average debris index was less than 1, while the calculus index was even lower. The combination of these two indices gives an OHI of 0.89 compared to 0.72 in 1978.

TABLE XIV

PERIODONTAL CONDITIONS

INDEX	MEAN	STAND. DEV
DEBRIS	0.83	0.51
CALCULUS	0.06	0.20
ORAL HYGIENE	0.89	0.55
CPITN	0.28	0.36

In considering these figures, some other factors must be taken into consideration. From the questionnaire completed by all students, (Table XV), it can be seen that, whereas 60% of the students brushed their teeth after breakfast, only 12% brushed after lunch. If one assumes that about half of the examinations were carried out after lunch, then the debris being read might not have been truly indicative of the oral hygiene status.

TABLE XV

BRUSHING HABITS

Brush after breakfast

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	514	25.5	25.5	25.5
Yes	1	1,204	59.8	59.8	85.3
No Breakfast	2	295	14.7	14.7	100.0
	TOTAL	2,013	100.0	100.0	

Brush after lunch

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	1,776	88.2	88.2	88.2
Yes	1	237	11.8	11.8	100.0
	TOTAL	2,013	100.0	100.0	

The method of partial recording within segments or "sextants" for the Community Periodontal Index of Treatment Needs (CPITN) has been described earlier in this report. Scores ranged from 0 to 4 with a score of 1 indicative of gingival bleeding after gentle probing. Referring back to Table XIV, it will be noted that the mean index was 0.28 which suggests that treatment needs for the group are very low and extend barely beyond that required for marginal gingivitis, a condition which is extremely common in this age group (Addy, M., et al, 1986.)

Table XVI shows a break down of the periodontal status within the three population areas identified in the study. A difference in supra-gingival calculus levels, significant at the .01 level, is noted. Calculus or scale forms when plaque becomes calcified and is common on the lingual surfaces of the lower anteriors and to a lesser extent on the buccal surfaces of the upper molars. It has been suggested (Cawson, R. A, 1978) that calcium salts precipitate more readily in an alkaline environment. It is of interest to speculate on whether or not the oral environment of rural dwellers is less alkaline than that of urban and metropolitan dwellers.

TABLE XVI

PERIODONTAL INDICES BY POPULATION AREA

INDEX	RURAL(N=893) MEAN	RURAL(N=893) STAN.DEV.	URBAN(N=590) MEAN	URBAN(N=590) STAN.DEV.	METROPOLITAN(N=1,634) MEAN	METROPOLITAN(N=1,634) STAN.DEV.
CALCULUS*	0.05	0.14	0.07	0.23	0.07	0.21
DEBRIS	0.83	0.50	0.86	0.55	0.81	0.51
CPITN	0.27	0.33	0.27	0.37	0.28	0.37

* Calculus: Rural vs. Metro: $p<.01$
: Rural vs. Urban & Metro: $p<.01$

Dental Caries

Traditionally, this has been the area in dental surveys upon which most attention has been focused. In the past, there seemed to be little point, especially in community health programs, in becoming too concerned about periodontal and orthodontic problems,

however important such conditions might be, without adequate measures to combat the ravages of dental caries. Now, however, at least in industrialized countries, the gradual but highly encouraging decline in dental caries prevalence over the last decade has begun to change the pattern of community dental health from caries prevention programs which were universally applied to programs which focus caries prevention towards areas of greatest need.

TABLE XVII

NUMBER OF DECAYED MISSING AND FILLED TEETH
AND CHILDREN WITH ZERO INCIDENCE
BY FLUORIDE LEVEL

	DMFT				
	ATA*			ZIA+	
	N	MEAN	STAN.DEV.	NO.	%
NON-FLUORIDE	208	3.88	3.28	30	14.4
FLUORIDE	2,909	3.04	2.81	717	24.6
	3,117	SIG.($p<.01$)		747	SIG. ($p<.01$)
TOTAL	3,117	3.09	2.85	747	24.0

* ATA: Affected Tooth Analysis

+ ZIA: Zero Incidence Analysis

Table XVII presents the number of decayed, missing and filled teeth by fluoride exposure. It must be stated quite clearly however that because of the ubiquitous use of fluorides and the mobility of the studied population, it is becoming increasingly difficult to identify groups who have not been exposed to significant amounts of fluoride during the six to eight year period of permanent tooth enamel development. In this study, questions were asked to determine how long the students had lived in the community where they were examined and, if less than five years, where they had lived before. These residency histories, which can be notoriously vague, were correlated with the use of fluoride supplements, fluoride rinse programs and community water fluoridation in an attempt to separate out a non-fluoride group. It will be noted from Table XVII that only 208 children could be so identified and, since the vast majority of households use fluoride toothpaste, even this group could not be considered completely free from fluoride exposure. Since however one of the objectives of the study was to compare the caries experience of children who had and had not been exposed to fluorides during permanent tooth development, the attempt was made. It will be noted that there was a significant difference in the total number of decayed, missing and filled teeth in the non-fluoride group compared to the fluoride group.

Table XVIII shows the twenty-one different area types identified in Alberta, based upon community size, school size and fluoride exposure, from which the sample was drawn. Table XIX illustrates that the 208 students in the non-fluoride group were drawn from rural areas designated as 01 and 02 and urban areas designated as 07 and 10. No non-fluoride areas were identified in the metropolitan population.

TABLE XVIII

SAMPLING AREAS BY FLUORIDE EXPOSURE RELATIVE TO COMMUNITY AND SCHOOL SIZE

Rural

	F^-	F^S	F^+
Small	01	02	03
Large	04	05	06

Urban

	F^-	F^S	F^+
Small	07	08	09
Large	10	11	12

Metropolitan

	F^-	F^S	F^+
Small	13	14	15
Medium	16	17	18
Large	19	20	21

Population

Rural	500 - 9,999
Urban	10,000 - 249,999
Metropolitan	250,000 and up

School Size

Rural and Urban:	Small	≤ 10	13.5 year olds/school
	Large	>11	13.5 year olds/school
Metropolitan:	Small	≤ 10	13.5 year olds/school
	Medium	11-49	13.5 year olds/school
	Large	>50	13.5 year olds/school

Fluoride

F^- $<$ 0.7 ppm F in water (naturally) no F added to water supply, no rinse or supplement program after the age of 8.

F^S $<$ 0.7 ppm F in water (naturally) no F added to water supply, rinse or supplement program for ages 8-12.

F^+ $\geq$ 0.7 ppm F in water either naturally or after addition of F to water supply, or rinse or supplement program which includes individuals up to and past the age of 13.

TABLE XIX

NUMBER OF CHILDREN EXAMINED BY HEALTH UNIT,
FLUORIDE EXPOSURE, COMMUNITY AND SCHOOL SIZE

Health Unit	*1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21*	
Alberta East Central	-	12	17	-	11	16	-	X	5	-	-	17	X	-	-	X	-	-	X	-	-	78
Alberta West Central	-	-	9	22	-	43	-	X	-	-	-	-	X	-	-	X	-	-	X	-	-	74
Athabasca	-	-	-	-	7	24	-	X	-	-	-	-	X	-	-	X	-	-	X	-	-	31
Barons - Eureka Warner	-	-	14	-	-	57	-	X	-	-	-	-	X	-	-	X	-	-	X	-	-	71
Calgary	-	-	-	-	-	-	-	X	-	-	-	-	X	25	-	X	194	-	X	617	0	836
Chinook	-	-	10	-	-	58	-	X	-	-	-	-	X	-	-	X	-	-	X	-	-	68
Edmonton	-	-	-	-	-	-	-	X	-	-	-	-	X	-	39	X	-	310	X	-	449	798
Jasper N.P.	-	-	-	-	-	2	-	X	-	-	-	-	X	-	-	X	-	-	X	-	-	2
Leduc - Strathcona	-	4	1	-	25	12	-	X	3	-	-	157	X	-	-	X	-	-	X	-	-	202
Lethbridge	-	-	-	-	-	-	-	X	1	-	-	83	X	-	-	X	-	-	X	-	-	84
Medicine Hat	12	-	3	40	-	10	2	X	-	64	-	-	X	-	-	X	-	-	X	-	-	131
Mount View	32	-	5	36	-	20	-	X	2	-	25	-	X	-	-	X	-	-	X	-	-	120
Peace River	-	-	12	-	-	66	-	X	-	-	-	-	X	-	-	X	-	-	X	-	-	78
Red Deer	-	2	2	-	8	59	-	X	5	-	-	62	X	-	-	X	-	-	X	-	-	138
South Peace	-	-	16	-	-	35	-	X	-	-	-	54	X	-	-	X	-	-	X	-	-	105
Sturgeon	-	-	-	-	-	107	-	X	5	-	-	86	X	-	-	X	-	-	X	-	-	198
Vegreville	-	-	8	-	-	38	-	X	-	-	-	-	X	-	-	X	-	-	X	-	-	46
Wetoka	-	7	2	-	24	5	-	X	-	-	-	19	X	-	-	X	-	-	X	-	-	57
TOTALS	44	25	99	98	75	552	2	X	21	64	25	478	X	25	39	X	194	310	0	617	449	3,117

* See Table XVIII for a description of the 21 sampling areas.

Of greatest interest here is the mean DMFT for the total population studied which is 3.09 as compared with 4.74 in the 1978 study. This represents a 35% decrease which, in the seven years between the studies, is indeed an encouraging result. Also, it will be noted from this table that 24% of the students had no decay experience (zero incidence) whatsoever in their permanent teeth which compares very favorably to the situation in 1978 when only 7.5% were in such a fortunate state. There was also a significant difference in zero incidence between the fluoride and the non-fluoride group with the fluoride group having a far greater percentage of children who had never experienced decay in their permanent teeth.

It is of importance to note that, when the total of 747 students with zero incidence is removed from the calculation, the DMFT for the remainder, i.e. those with any decay, rises to 4.06. This is not to suggest that the overall DMFT of 3.09 is a flawed figure since those students with no decay experience reflect the most successful aspects of preventive dentistry over the last two decades. However, when this figure of 4.06 is compared to 5.12 for a similar group in 1978, it will be recognized that, notwithstanding the almost threefold increase in those with zero incidence between the two surveys, even those with any decay whatsoever have shown an impressive 21% decline in DMFT.

Table XX illustrates that, excluding those with zero incidence, 4.0 was the most common frequency or mode of the DMFT distribution and that nearly one half (47.5%) of Alberta 13 year olds have only two or fewer decayed missing or filled teeth.

TABLE XX

FREQUENCY DISTRIBUTION OF

NUMBER OF DECAYED, MISSING OR FILLED TEETH

DMFT	NO.	%
0.0	747	24.0
1.00	317	10.2
2.00	415	13.3
3.00	344	11.0
4.00	502	16.1
5.00	281	9.0
6.00	179	5.7
7.00	115	3.7
8.00	89	2.9
9.00	42	1.3
10.00	17	0.5
11.00	23	0.7
12.00	13	0.4
13.00	10	0.3
14.00	6	0.2
15.00	5	0.2
16.00	6	0.2
17.00	2	0.1
18.00	3	0.1
19.00	1	0.0
TOTAL	3,117	100.0

Table XXI shows the frequency distribution of the occurrence of the D (decayed) component of the DMFT. It will be noted that 65.4% of the students had no decayed teeth. This percentage includes the 24% with zero incidence together with those who had had all decayed teeth restored.

TABLE XXI

FREQUENCY DISTRIBUTION OF NUMBER OF DECAYED TEETH

Total Sample - 3,117 Number with decayed teeth (DT) - 1,078

DT	FREQUENCY	# OF DECAYED TEETH	% OF TOTAL SAMPLE	% OF THOSE WITH DECAY
0	2,039	0	65.4	0
1	529	529	17.0	49.1
2	261	522	8.4	24.2
3	125	375	4.0	11.6
4	82	328	2.6	7.6
5	34	170	1.1	3.2
6	21	126	0.7	1.9
7	7	49	0.2	0.7
8	6	48	0.2	0.6
9	2	18	0.1	0.2
10	3	30	0.1	0.3
11	2	22	0.1	0.2
12	3	36	0.1	0.3
13	3	39	0.1	0.3
TOTALS	3,117	2,292	100.0	100.0

Of the 35% of students with decayed teeth, almost 50% of them had only one decayed tooth and 73% had two or less decayed teeth. Those who had 4 or more decayed teeth comprised only 15% of the students with decay. This table should be studied with Table XXII which shows the frequency distribution of the occurrence of the F (filled) component of the DMFT. It will be noted that an inverse relationship exists between the D (decayed) and F components. The high F component relative to the D component is indicative of a desirable treatment level.

TABLE XXII

FREQUENCY DISTRIBUTION OF NUMBER OF FILLED TEETH

FT	FREQUENCY	PERCENT
0.0	1,062	34.1
1.00	354	11.4
2.00	414	13.3
3.00	337	10.8
4.00	496	15.9
5.00	175	5.6
6.00	102	3.3
7.00	62	2.0
8.00	46	1.5
9.00	22	0.7
10.00	13	0.4
11.00	9	0.3
12.00	9	0.3
13.00	4	0.1
14.00	3	0.1
15.00	4	0.1
16.00	2	0.1
18.00	2	0.1
19.00	1	0.0
TOTAL	3,117	100.0

One of the stated objectives of the survey was to make a comparison between the dental health of rural and urban children. This of course, should have been more carefully stated to include the metropolitan dwellers. The rural, urban and metropolitan periodontal indices were discussed elsewhere in this report [Table XVI] while Table XXIII shows the DMFT indices for these areas.

In the 1978 survey, there was no appreciable difference in the caries experience (DMFT) between metropolitan, urban and rural teenagers. There was however, a statistically significant difference

between the number of missing teeth in each of the three groups, with the rural and urban group respectively showing a higher mean value than their metropolitan counterparts.

TABLE XXIII

DECAYED, MISSING AND FILLED

INDICES BY POPULATION AREA

INDEX	RURAL(N=893) MEAN	STAN.DEV.	URBAN(N=590) MEAN	STAN.DEV	METROPOLITAN(N=1,634) MEAN	STAN.DEV.
DMFT*	3.37	2.81	3.19	2.95	2.90	2.83
DT¶	0.91	1.52	0.73	1.48	0.64	1.33
MT§	0.05	0.30	0.03	0.27	0.02	0.22
FT	2.41	2.50	2.43	2.48	2.24	2.49

¶ DT	:	Rural vs Urban:	$.01<p<.05$
	:	Rural vs Metro:	$p<.01$
	:	Rural vs Urban & Metro:	$p<.01$
§ MT	:	Rural vs Metro:	$p<.01$
	:	Rural vs Urban & Metro:	$p<.01$
* DMFT	:	Urban vs Metro:	$.01<p<.05$
	:	Rural vs Metro:	$p<.01$
	:	Rural vs Urban & Metro:	$p<.01$

In the 1985 survey, the caries experience (DMFT) showed a gradient from 3.37 teeth in the rural to 3.19 in the urban and down to 2.90 in the metropolitan areas. There was no significant difference between the rural and urban DMFTs; but there were significant differences between rural and metropolitan DMFTs, and between rural and combined urban and metropolitan DMFTs.

Looking at the number of decayed teeth (DT) and missing teeth (MT), it will be seen that the metropolitan and urban dwellers fared somewhat better than their rural counterparts. However, the absolute differences between the three areas, was not great and no suggestion is made that the children in rural areas are not receiving adequate dental care.

Treatment Needs

The most common treatment required was that of prophylaxis or professional tooth cleaning and 50% of the students examined were deemed to be in need of this (Table XXIV). While this appears to be a somewhat high percentage, a glance at Table XXVI (page 41) will show relatively wide inter-examiner differences in the reading of the oral hygiene index, a situation very common in similar studies and indicative of a greater influence of the subjective clinical decision than one would prefer to see.

TABLE XXIV

TYPE OF TREATMENT REQUIRED

	NO.	%
PROPHYLAXIS	1,588	50.9
ORTHODONTICS	1,132	36.3
OPERATIVE	1,073	34.4
FIXED PROSTH.	52	1.7
SURGERY	34	1.1
PERIODONTAL	12	0.4
ENDODONTICS	10	0.3
REM. PROSTH.	5	0.2
BIOPSY	2	0.1

Of greater interest in Table XXIV is the similarity between the percentages needing restorative treatment and those needing orthodontic treatment. However, although the needs are similar, they are not being met in a similar fashion. A re-examination of Table XI (on page 21) shows that only 14% of the students were wearing or had worn orthodontic appliances; on the other hand, Table XXII shows that, excluding the 747 students with zero incidence, 87% of the remainder had one or more restorations placed.

Although the increase in the number of orthodontic appliances between the two surveys has been noted, it is obvious that priority is still given to fillings. This situation is likely to continue until the inclusion of orthodontic treatment becomes more common in pre-paid dental plans.

Table XXV which shows the number of teeth by the treatment required has some important implications. Of the teeth needing treatment, almost 100% of them had been affected by caries but 1851 or 81% of these were in need of only a one surface restoration. Further analysis of the data would certainly confirm that the majority of these carious lesions were of the pit and fissure type and largely affect the occlusal and/or buccal surfaces of the six-year molars (Graves R. C., et al, 1985).

The National Dental Caries Prevalence Survey (1979-1980) cited in the paper by Graves et al, showed that only 16% of the caries experience of 5 to 17 year old children occurred on the smooth surfaces, but 84% involved surfaces with pits and fissures.

TABLE XXV

NUMBER OF TEETH REQUIRING TREATMENT BY TYPE OF TREATMENT

TREATMENT	NO.	%
REST. - ONE SURFACE	1,851	81.1
REST. - TWO SURFACES	286	12.5
REST. - THREE SURFACES	35	1.5
REST. - FOUR SURFACES	42	1.8
EXTRACTION (CARIES)	44	1.9
EXTRACTION (OTHER)	1	0.0
OTHER	24	1.0
	2,283	99.8

It has been generally accepted that fluorides give greater protection to the smooth surfaces of the teeth than to the fissured or biting surfaces, although the notion that occlusal surfaces do not benefit from fluorides has been challenged (Ripa, et al, 1985). What is certain however, is that the use of pit and fissure sealants can drastically reduce the caries susceptibility of these occlusal surfaces (Ripa, L. W., 1985).

Pit and fissure sealants have been in fairly common use for the last fifteen years although the earliest studies go back almost thirty years (Cueto, E., Buonocore, M. G., 1967). There has always been a resistance to their use by some members of the dental profession who have expressed fears about the research data justifying their use; about the frequent loss of sealants; about the possibility

and the consequences of sealing in decay and about their effectiveness in comparison with the amalgam filling which many practitioners still claim can be placed with better cost effectiveness. All of these arguments have been refuted, yet they are still cited today. (Silverstone, L.M., 1984)

The data presented in Table XXV are further evidence of the need for wider use of sealants to achieve which, changes are needed in the methods of delivering this most useful of preventive measures. The DMFT of 3.09 for the thirteen year olds examined in this survey was 24% decay, 1% missing teeth and 75% fillings. If one could assume that 80% of the D and F components were the result of occlusal caries, the use of pit and fissure sealants on at-risk surfaces, could easily reduce the DMFT to less than 2.0 within the next five years.

Examiner Comparability

Table XXVI shows the comparison between examiners and is an indication of the extent to which the pre-survey calibration was successful. It will be noted that inter-examiner differences exist in reading calculus (scale), debris, oral hygiene and the Community Periodontal Index of Treatment Needs (CPITN). This is probably a reflection of the subjectivity of these measurements. However, in reading the number of decayed, missing and filled teeth (DMFT), there was no examiner variation. The comparisons were made between the four different children cohorts examined, not between four examinations made upon the same cohort.

TABLE XXVI

EXAMINER COMPARISONS

	MEANS				
EXAMINER	CALCULUS	DEBRIS	ORAL HYGIENE	CPITN	DMFT
1	0.10	1.26	1.36	0.66	3.13
2	0.11	0.48	0.59	0.08	3.13
3	0.01	0.92	0.93	0.11	2.98
4	0.02	0.61	0.63	0.26	3.12

Re-examination

When feasible, each examiner re-examined one in ten of his or her student quota for the day. The recorders made every effort to ensure that the examiners were unaware that a duplicate examinee had been seated.

TABLE XXVII

DUPLICATE EXAMINATIONS - CALIBRATION BY INDEX

INDEX	MEAN DIFFERENCES	STAN. DEV.
CALCULUS	0.01	0.08
DEBRIS	0.12	0.26
CPITN	0.05	0.17
DMFT	0.02	0.56
DT	0.02	0.48
MT	0.00	0.00
FT	0.00	0.34

Table XXVII shows that there were no differences between the first and second assessments which is an indication of the high standard of care and consistency achieved and maintained by the examiners throughout the survey.

Other Conditions

Table XXVIII shows that a majority of the children had a Class I occlusal relationship which generally can be considered as normal occlusion. Of the remainder, 15% had a Class II occlusal relationship which might generally be described as a tendency towards a receding jaw, while 5% had a Class III relationship which is a tendency towards a prominent lower jaw.

TABLE XXVIII

MOLAR RELATIONSHIP

	NO.	%
CLASS I	2,231	71.6
CLASS II	472	15.1
CLASS III	164	5.3
(EXCLUDED)	250	8.1
	3,117	100.1

This interpretation of the three occlusal classes is a very simplistic one, but these findings indicate that at least 20 percent of thirteen year olds in Alberta could be suffering from some occlusal disharmony and would benefit from orthodontic care. There are many other positional conditions of the teeth not related to the molar relationship which demand such care, but although the results of orthodontic treatment usually confer great psychological as well as bio-mechanical benefits, it is too often conceived, by both parents and insurance carriers, as being too expensive.

Table XXIX shows the percentage of children with fractured anterior teeth.

TABLE XXIX

FRACTURED ANTERIOR TEETH

	NO.	%
NONE	2,618	83.9
CORNER ENAMEL	292	9.4
CORNER DENTINE	45	1.4
CORNERS HORIZONTAL	13	0.4
PULP	5	0.2
(EXCLUDED)	144	4.6
	3,117	100.0

The Questionnaire

All students who participated in the survey were asked to complete a questionnaire which sought to discover information about their environment and oral hygiene habits. Only 65% of the students returned the questionnaire and it has been learned from dental divisions in participating health units that many of the questions asked caused resentment; others were inadequate to obtain the information being sought and some were not clear and answerable. It is the intention of the Survey Committee to redesign the questionnaire before the next survey using expertise of the University of Alberta Department of Sociology.

The results of the questionnaire are included as Appendix C without comment, with the exception of Table XV (page 26).

Conclusion

The first of the four objectives of this survey was:

To determine the changes in the dental health status of Alberta school children between 1978 and 1985.

For reasons given on page 5 under Study Design, the 1978 and 1985 surveys are only comparable in respect of the 13 year old population. Table XXX shows the DMFT comparison.

TABLE XXX

COMPARISON OF CARIES EXPERIENCE IN THE PERMANENT DENTITION OF 13 YEAR OLD ALBERTA SCHOOL CHILDREN IN 1978 AND 1985

Year	N	Mean # of Teeth Present	Mean D	M	F	DMFT	% of Zero Incidence
1978	905	26.3	1.25	0.17	3.31	4.74	7.5
1985	3,117	26.6	0.74	0.03	2.32	3.09	24.0

This 35% decrease in DMFT from 4.74 to 3.09 in the seven years between studies is in line with decreasing caries rates in some of the industrialized countries of the world (FDI/WHO 1985). In looking towards the results of the next Alberta survey which, it is hoped will be carried out in 1990, a DMFT of less than 2.0 is easily within reach. Indeed the State of Indiana reported a 1982 DMFT of 1.92 for a population of 510 thirteen year old children (Stookey, G.K., et al, 1985).

Table XXXI shows a comparison of the Oral Hygiene Indices for the two surveys.

TABLE XXXI

COMPARISON OF MEAN INDEX VALUES FOR ORAL HYGIENE AMONG 13 AND 14 YEAR OLD ALBERTA SCHOOL CHILDREN IN 1978 AND 1985

YEAR	N	DEBRIS	CALCULUS	O.H.I.
1978	1,254	0.66	0.06	0.72
1985	3,117	0.83	0.06	0.89

Before commenting upon this table, it should be noted that the 1978 N of 1,254 was composed of both 13 and 14 year old students, but this age discrepancy, at least as far as oral hygiene is concerned, should not compromise the validity of any comparison. The Oral Hygiene Index is arrived at by an addition of the debris and calculus scores. It would appear that oral hygiene among Alberta teenagers has not shown any improvement between surveys.

The second objective of the study was:

To compare the dental health status of Alberta school children with that of school children in other provinces and other countries.

One of the difficulties encountered in making this comparison is the lack of published up-to-date data. Another is the possibility that, because of differences in study design, examiner qualifications and calibration, the studies might not be validly compared at all. In Table XXXII however, data garnered from studies in Canada and other industrialized countries are presented.

TABLE XXXII

CARIES PREVALENCE IN TEENAGE CHILDREN IN CANADA AND OTHER INDUSTRIALIZED COUNTIRES

COUNTRY	AGE GROUP	YEAR OF SURVEY	DMFT
Canada			
Alberta	13	1985	3.09
* New Brunswick	13-14	1982	5.04
* Newfoundland	13-14	1982	5.86
* Nova Scotia	13-14	1982	5.72
* Quebec	13-14	1984	6.00
¶ Ontario	13	1985	2.51
§ British Columbia	13	1980	4.95
¶¶ Saskatchewan	13	1986	4.61
Other Countries			
** Norway	12	1982	4.4
** New Zealand	12	1983	3.3
** Denmark	12	1981	4.7
** Finland	12	1982	4.1
** Netherlands	12	1982	3.9
** Australia	12	1983	2.8
** U.S.A.	12	1980	2.6
** United Kingdom	12	1983	3.0
** Sweden	12	1982	3.4

* Quoted by Clark, D.C. et al, 1985
¶ Dental Health Indices - Province of Ontario
§ Hann, H.J. et al, 1984
¶¶ Young, W. J. Canad. Assoc. 1986
** FDI/WHO, 1985

Within the limitations discussed above, Alberta's 1985 DMFT of 3.09 indicates that those factors which, in the last two decades, have been operating to reduce decay rates in the world's industrialized countries, have operated successfully in this Province.

The third objective of the study was:

<u>To use this information, to whatever extent it can properly be used, in a review of the impact of Provincially funded dental health programs.</u>

It would be simple enough here to state that, based upon the discussion above, the Provincially funded dental health programs have made a completely acceptable impact on the dental health of Alberta school children. The problem is, of course, to identify the particular contribution of the individual components of dental programs to this decline in decay rates. Since dental epidemiologists, in speculating about this decline, have not been able to provide a precise explanation for it, they cannot therefore predict the future course of caries prevalence. Perhaps the best use that can be made of this information is to ensure that, at least until the continuing downward trend in caries rates can be confirmed by the third Alberta dental health survey, no great program changes should be made.

In the 1978 survey, it was stated that 15% of the children examined were responsible for 66% of the decay. If Table XXI (page 34) of this report is re-examined, it will be seen that those students who had four or more decayed teeth represented 15% of those with decay and were responsible for 39% of the total number of decayed teeth found. Both the 1978 and 1985 figures signify the need for services targeted towards those children in high risk and high need groups, and such targeting has become a characteristic of many health unit dental programs.

The fourth objective of the study was:

To compare the dental health status of rural children with that of urban children and to compare the caries experience of children who have been exposed to optimal fluorides during tooth development with those who have not.

One impetus for the comparison of dental health of rural and urban Albertans stems from the 1976 Report of the Committee on Dental Services to Rural Areas which emanated from the Senate of the University of Alberta. Two of the assumptions made in that report were that:

> The level of dental health is poor in many areas, especially isolated rural areas, and many Albertans, perhaps a majority, suffer from poor dental health

and that:

> The capacity and the mode of the present dental service delivery system is incapable of meeting any major increase in demand and is probably not even meeting present demand in parts of the Province.

The 1978 survey failed to confirm, to any great extent, the first of these assumptions. It did find a significant difference in the decayed and missing components between the rural and metropolitan areas but concluded that the "magnitude of these differences is not particularly impressive."

In selecting the sample for the 1985 study, special care was taken to obtain an adequate representation from small schools (i.e. ten or fewer enrolled 13 year olds) for both metropolitan and non-metropolitan areas and this ensured that the smallest of rural areas were not overlooked. Some significant differences were found in the

DMFT between the rural and non-rural areas, and the difference was, as in 1978, in the decayed and missing components of the DMFT, but it was not such that those responsible for the delivery of dental services, either curative or preventive, should be greatly concerned.

Addressing the second assumption made by the Senate Committee, there is no doubt now that the delivery service is meeting the demand in rural areas. This is indicated by the lack of difference in the filled component of the DMFT between rural and non-rural areas. Also of interest in this regard is that fully 50% of the dentists practicing in the Northern districts of Alberta graduated within the last ten years! (Alberta Dental Association Directory, 1986)

On the matter of fluoride versus non-fluoride areas, it is clear that the identification of any large population in Alberta who fall into the latter category has become a difficult task which will require far more effort than the mere residence history data in this study. Indeed with the widespread use of fluoridated dentifrice, it might well be an impossible task.

For the future, no dramatic changes in health unit programming are recommended with the following exceptions:

1) Steps must be taken to ensure the far wider use of pit and fissure sealants by both the private and public sectors of the profession.

2) Targeting of groups and individuals most in need must be further encouraged, leaving universality to community water fluoridation and fluoride dentifrice.

The children of Alberta are enjoying good dental health, and undue haste in implementing dramatic changes in present programs would be unwise. Sound dental health demands proper maintenance; but if in 1990, the improvement seen in 1985 is confirmed as being a significant and lasting trend, then program modification will have to be carefully considered.

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APPENDIX A

HEALTH UNIT ASSOCIATION OF ALBERTA
Alberta Dental Health Survey of School Children
Oral Health and Treatment Assessment Form
1985

Today's Date _____

School _____

Student's Name _____

Teacher's Name _____

A. Personal and Demographic Information

Case Number	1-4	☐☐☐☐
Health Unit - Department _____	5-6	☐☐
Dentist/Population Ratio _____	7-10	☐☐☐☐
Sex 1 Male 2 Female	11	☐
Age (at last birthday) _____	12-13	☐☐
Birthdate _____ (Day Month Year)	14-19	☐☐ ☐☐ ☐☐ (DA MO YR)
Father's Occupation _____	20-22	☐☐☐
Home Mailing Address _____	23-24	☐☐
*Length of Residence at that address	25-26	☐☐
*If less than 5 years Please indicate previous address _____	27-28	☐☐
Examiner 1. _____ 2. _____ 3. _____ 4. _____	29	☐
Duplicate Examination 0. No 1. Yes	30	☐

B. Service Utilization

1 Did you obtain dental care in the last 12 months? 0. No 1. Yes	31	☐
IF YES a) For what reason? _____	32	☐
and b) Who treated you? _____	33	☐
IF NO c) Why not? _____	34	☐
2. Do you think there is anything wrong with your teeth, gums, or mouth now? 0. No 1. Yes	35	☐
IF YES a) Do you want to see a dentist concerning this condition? 0. No 1. Yes	36	☐
IF YES b) Approximately, what sort of treatment or advice would you want from the dentist? _____	37	☐

C. Year _____ 38-39 ☐☐

D. Teeth Present

Number of Deciduous Teeth 40-41 ☐☐

Number of Permanent Teeth 42-43 ☐☐

E. Debris Index

0-Negative
1-1/3 or less
2-More than 1/3, less than or equal to 2/3
3-More than 2/3
X-Excluded

B16 La11 B26
44-46 ☐☐☐
47-49 ☐☐☐
L46 La31 L36

F. Calculus Index

0-Negative
1-Supragingival, less than 1/3
2-Supragingival, more than 1/3, less than or equal to 2/3, or subgingival flecks
3-Supragingival, more than 2/3 or subgingival continuous band
X-Excluded

B16 La11 B26
50-52 ☐☐☐
53-55 ☐☐☐
L46 La31 L36

G. Community Periodontal Index of Treatment Needs (CPITN)

0-No sign of disease
1-Gingival bleeding after gentle probing
2-Supra or subgingival calculus
3-Pathologic pockets 4 or 5 mm deep
4-Pathologic pockets 6 mm or deeper

URP UA ULP
56-58 ☐☐☐
59-61 ☐☐☐
LAP LA LLP

H. Dental Caries and Treatment Requirements

Dental Caries

Permanent

S-No caries
T-Trauma
D-Decayed
K-Filled & primary decay
Y-Filled & secondary decay
F-Filled & caries free
C-Crowned
Q-Crowned & decayed
M-Missing due to caries
P-Missing-periodontal
A-Absent - congenital, ortho, etc.
X-Excluded
Z-Other (sealants)

Treatment Required

0-None
1-One-surface restoration
2-Two-surface restoration
3-Three-surface restoration
4-More than three-surface restoration, or crown
5-Extraction (caries)
6-Extraction (periodontal disease)
7-Extraction (denture)
8-Extraction (other reasons)
9-Other

		18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Caries	62-77																
Treatment	78-93																

		48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Caries	94-109																
Treatment	110-125																

I. Non-Carious Missing Teeth

0-None
1-Ortho extraction(s)
2-Trauma loss - sports
3-Trauma loss - other
4-Congenitally absent
5-Other or combination of above (specify) _____
X-Excluded

126 ☐

J. Fractured Anterior Teeth (most severe tooth, if more than one)

0-None
1-Chipped enamel, corner only
2-One corner only, involves dentine
3-Involves both corners, horizontal fracture
4-Pulp involvement
X-Excluded

127 ☐

K. Orthodontic Appliances Present

0-None
1-Unilateral space regainer
2-Bilateral space regainer
3-Anterior crossbite appliance
4-Arch expansion appliance
5-Crib
6-Extra oral retainer (headgear)
7-Full banding
8-Other (specify) _____
9-Full banding not present, but previously worn

128 ☐

L. Dental Classification

1-No treatment required
2-Delay treatment
3-Immediate treatment
4-Emergency treatment

129 ☐

M. Type of Treatment Needed (List in order of immediacy).

0-No treatment needed	130 ☐
1-Cleaning	131 ☐
2-Operative	132 ☐
3-Surgery	133 ☐
4-Prosthetics (removable)	134 ☐
5-Biopsy	135 ☐
6-Fixed prosthetics	136 ☐
7-Periodontal (gingival)	137 ☐
8-Endodontic	138 ☐
9-Orthodontics	

N. Denture Possession

0-No denture
1-Wearing denture
2-Previously had but not now wearing denture

Upper Full 139 ☐
Partial 140 ☐
Lower Full 141 ☐
Partial 142 ☐

O. Denture Requirement

0-None
1-New denture required
2-Repair, reline, remodel

Upper Full 143 ☐
Partial 144 ☐
Lower Full 145 ☐
Partial 146 ☐

P. Bridge Possession

0-No bridge
1-One bridge
2-Two bridges
3-Three or more bridges

Upper Jaw 147 ☐
Lower Jaw 148 ☐

Q. Bridge Requirement

0-None
1-One bridge
2-Two bridges
3-Three or more bridges

Upper Jaw 149 ☐
Lower Jaw 150 ☐

R. Molar Relation

1-Class I (Neutroclusion)
2-Class II (Distoclusion)
3-Class III (Mesioclusion)
X-Not applicable

151 ☐

S. Anterior White Opacities

0-Absent
1-Present, <0.5 mm diameter
2-Present, 0.5-2 mm diameter
3-Present, >2 mm diameter
4-Present, brownish with pitting
X-Not applicable

152 ☐

APPENDIX B

HEALTH UNIT ASSOCIATION OF ALBERTA
Alberta Dental Health Survey of School Children

ORAL DATA COLLECTION GUIDE

and

EXAMINATION CRITERIA

January 1985

Introduction

This guide to data collection and examination criteria has been adapted from the printed material* which you received at the recent calibration session. It is hoped that all the modifications suggested at that session have been included in the following pages. In particular however, your attention is brought to the following changes:

1. When tooth condition is marked S (Sound) then the treatment should be marked 0 (None). In other words, preventative restorations should not be indicated.

2. Section L - Dental Classification refers only to caries related or other pain-causing or potentially pain-causing conditions. It is possible therefore to mark Box 129 as 0 - meaning no treatment required, and under the next section M Type of Treatment Needed to mark 1 in Box 130 and 1 in Box 138A. However, if Box 129 is marked as 4 indicating, for example, an acute abscess then Box 130 and Box 133 might be marked 1.

* 1. W.H.O./D.D. International Collaborative Study of Dental Manpower Systems in Relation to Oral Health Status.

2. Oral Health Survey - Basic Methods, Second Edition. World Health Organization, Geneva, 1977.

3. Development of the W.H.O. Community Periodontal Index of Treatment Needs (CPITN). Ainamo J., Barmes D., et al.

1. The Oral Health and Treatment Assessment Form (OHTAF)

The OHTAF form should be completed as follows:

In order to save time, the date, school, student's name and teacher's name should, if possible, be completed prior to the actual examination.

Boxes 1 - 10	These will be completed at a later date.
Boxes 11 - 19	Complete at examination. Where space is provided on left-hand side of OHTAF complete in writing in addition to box completion.

Boxes 20 - 24	Complete in writing. Do not complete boxes.
Boxes 25 - 26	Complete.
Boxes 27 - 28	Complete only if 25 - 26 is less than 05 years. Also write in previous address on left.
Box 29	Know your examiner's code and complete. Also write in examiner's name on the left: 1. Dr. A. T. Craig 2. Dr. P. D. Finnigan 3. Dr. R. V. Valentini 4. Dr. A. L. Lizaire
Box 30	In selecting students for duplicate examinations, the recorder should make every effort to ensure that the examiner is not able to recognize that the student has been previously examined. Approximately one in ten students should be selected for re-examination. Complete with 0 or 1.
Box 31	Complete.
Boxes 32 - 34	Complete in writing. Do not complete boxes.
Boxes 35 - 36	Complete.
Box 37	Complete in writing. Do not complete box.
Boxes 38 - 39	This will always be 85.
Boxes 40 - 61	Complete. (Note that Box 59 should read LRP, meaning lower right posterior (segment)).
Boxes 62 - 125	Complete. Note that Z (sealants) will not be called, and that X - Excluded is to be used for:- 1) unerupted permanent teeth 2) primary tooth present 3) banded teeth

Box 126	Complete. Note that X will be used to indicate an exfoliated deciduous tooth.
Boxes 127 - 128	Complete. Note that Code 7 under Orthodontic Appliances Present will be used for full upper or full lower banding or both.
Box 129	Dental Classification. This refers only to dental caries, dental trauma or to some other pain-causing or potentially pain-causing condition. Also note that Code 2 is changed from Delay Treatment to Treatment required.
Boxes 130 - 138A	The heading of this section should be changed or at least understood to read Type of Treatment Needed/ Not Needed. If Box 130 is coded zero then 131-138A must be coded zero, i.e. no treatment of any type needed. If Box 130 is coded 1, then at least one box from 131-138A will have to be coded 1. The recorder should call out all of the types of treatment listed and complete the boxes with 1 or 0 but no order of priority need be given. (Box 138A will have to be pencilled in.)
Boxes 139 - 150 (molar relation)	Complete.
Box 151	This should be read on the right side. <u>Only</u> go to the left side if one of the right 6 year molars is excluded for any reason.
Box 152	Complete. If the severest condition, i.e. code 4 is readable immediately after drying, it will not be necessary to wait one minute.

2. <u>Recording Techniques</u>

Please use pencil only for completing boxes.

To avoid confusion and the danger of computing inaccurate results, numerals should be printed clearly in the following manner:

1 2 3 4 5 6 7 8 9 0

Make certain that the number 5 is made with a straight top line to distinguish it from an S.

When letters are used instead of numbers, each letter should be capitalized as follows:

S T D K Y F M X

(Note the arms of the "D" to avoid confusion with "O".)

Clear enunciation is essential in calling out scores to recorder in order to differentiate unmistakably between similar sounding codes, e.g., eight and A. Adoption of a word system such as the international airline system - able, baker, etc. - may be useful.

Recorders should call for the information required tooth by tooth, segment by segment, or item by item as appropriate, and to maintain a surveillance for obvious errors; for example, recording on wrong side or wrong jaw, or marking a tooth present when it is absent, etc.

Recorders should put their initials at the lower left hand corner of the first page.

At the end of the day, recorders should check forms for errors and clarity. Erase and make clear where necessary.

3. The Oral Examination

Boxes 40 - 43 - Number of Teeth Present

Commencing with this measurement and continuing through all the oral examination forms, it will be the recorder's responsibility to indicate to the examiner what piece of information is being collected. The recorder should be trained to look for inconsistencies and to question any information that may appear erroneous or even unlikely. A tooth is present and examined for caries provided any part of the tooth has penetrated the oral mucosa.

Boxes 44 - 55 - The Debris and Calculus Index

The examination is limited to 6 permanent tooth surfaces - the labial surface of the upper right incisor, the labial surface of the lower left central incisor, the buccal surfaces of the upper first permanent molars, and the lingual surfaces of the lower first permanent molars. When any of these teeth are missing a comparable adjacent tooth is substituted. No score is assigned unless 2 of the 6 possible surfaces or their substitutes have been examined. Only fully erupted teeth are scored. Oral debris and stain are scored together and calculus is scored separately.

a) Debris Index

0 - No debris or extrinsic stain.

1 - Soft debris covering not more than one-third of the tooth surface, or extrinsic stain without debris regardless of the surface area covered.

2 - Soft debris covering more than one-third but not more than two-thirds of the exposed tooth surface.

3 - Soft debris covering more than two-thirds of the exposed tooth surface.

X - Excluded segments.

Oral debris is detected by running the side of a sickle explorer across the surface to be examined, commencing at the occlusal third, moving to the middle third and finally examining the gingival third.

b) Calculus Index (CI)

0 - No calculus present

1 - Supragingival calculus covering not more than one-third of the exposed tooth surface.

2 - Supragingival calculus covering more than one-third but not more than two-thirds of the exposed tooth surface, or individual flecks of subgingival calculus around the cervical portion of the tooth.

3 - Supragingival calculus covering more than two-thirds of the exposed tooth surface, or a continuous heavy band of subgingival calculus around the cervical portion of the tooth.

X - Excluded segments.

Calculus is not considered to be subgingival unless it lies within the gingival sulcus at the time of examination.

N.B. For both debris and calculus indices, a tooth is considered to be fully erupted and therefore available for scoring when the occlusal or incisal surface has reached the occlusal plane.

A surface is defined as encompassing half the circumference of the tooth. It includes the buccal or lingual half of the tooth and the entire area between the incisal edge or occlusal surface and the crest of the gingivae.

Boxes 56 - 61 - Community Periodontal Index of Treatment Needs (CPITN)

For the purpose of this examination, the mouth is examined in six segments - upper and lower right posterior, upper and lower left posterior and upper and lower anterior. Within these "sextants", ten index teeth have been designated.

These are: 17, 16, 11, 26, 27

47, 46, 31, 36, 37

Although all ten teeth are examined, only one recording per sextant is made. When both or one of the designated molar teeth are present, the most severe condition only is recorded for the sextant. If no index teeth are present in a sextant, all remaining teeth in that sextant are examined and the most severe condition is recorded.

(For a complete description of the CPITN, refer to the paper "Development of the World Health Organization (WHO) Community Periodontal Index of Treatment Needs (CPITN) by Ainamo, Barmes et al; a copy of which you received at the calibration exercise.)

Boxes 62 - 125 - Dental Caries and Treatment Requirements

The examination for caries should be conducted with a plain mouth mirror and a sharp explorer or probe (maillefer 20) in a good light (a fibre optic light is used).

The examiner should commence the examination on the upper right, upon the call of upper right 8 (tooth number 18) by the recorder. He should then proceed to call condition first and treatment second, following the recorder's call of each individual tooth, continuing to the upper left 8, (number 28) proceeding to the lower left 8 (number 8) and ending at the lower right 8 (number 48). Treatment follows condition for both upper and lower jaws for the convenience of the recorder.

Conditions

S - Sound

A tooth should be considered sound it if shows no evidence of treated or untreated caries or if it is at the doubtful stage where one might clinically decide to place a filling but where frank decay has not been positively detected, e.g. "sticky" fissure. These scores may also apply in the case of defects not to be counted as caries:

a) white and/or chalky spots;

b) discoloured or rough spots;

c) hard-stained pits or fissures in the enamel that catch on the explorer point but do not have a detectably softened cavity, undermined enamel, or softening in the walls of the pit or fissure.

T - Trauma

A permanent tooth should be recorded "trauma" if part of its substance is missing for reasons other than treated or untreated caries and the latter condition is not present. Defects not to be counted as caries described above are not included in this category.

D - Decayed

Caries will be considered to be present in a tooth when any lesion has a detectably softened floor, undermined enamel, or softened wall. On an interproximal surface, the probe point must enter a lesion with certainty. Where any doubt exists, caries should not be diagnosed as being present. It must be emphasized that clinical caries is a stage in the process of dental caries. Dental caries proceeds from a microscopic lesion, which cannot be diagnosed positively by present clinical methods, to a cavity (or clinical caries) which can be diagnosed by clinical examination. The upper limit for this category is complete destruction of a crown.

The stages of dental caries that precede cavitation and other conditions similar to the early stages of caries should be deliberately excluded because they cannot be diagnosed positively and reliably. In general be guided by the following two statements: -

1. When in doubt, mark it sound

2. If it is taking that long to find, it isn't there!

Decayed is recorded where a tooth contains a temporary filling requiring further treatment, or where a complete filling is lost. (See Filled for defective filling.)

K - Filled and primary decay

A tooth should be classified filled and primary decay when one or more surfaces have been filled and another discrete surface or area is carious.

Y - Filled and secondary decay

A tooth should be classified filled and secondary decay when there is recurrent caries around a filling.

F - Filled

Teeth should be considered filled whenever a filling of any permanent material is present and there is no discrete or recurrent caries. A defective filling where there is no discrete or recurrent caries, e.g. cracked or partly missing, is scored "F" with the appropriate treatment code indicating the replacement restoration required. A tooth with a three-quarter crown should also be recorded as filled even if it is a bridge abutment. (See crowned for a tooth which has a full crown, e.g. total coverage, including bridge abutment.)

C - Crowned

A tooth should be placed in this category if it has a full crown (intended total crown coverage) in a permanent material and including bridge abutments. C is still the score even where the reason for the crown is trauma.

Q - Crowned and decayed

A tooth should be scored crowned and decayed where there is either a discrete (presumably root) or recurrent caries lesion.

M - Missing due to caries

A tooth should be scored as missing only when it has been extracted primarily because of caries. Eruption patterns and the status of the corresponding tooth space in the opposite segment provide useful clues where the cause of the loss is in doubt. In the absence of a positive history of caries-related tooth loss or at least convincing circumstantial evidence thereof, a permanent tooth space should be scored P, A, or X.

P - Missing due to periodontal disease

This category should be used when permanent teeth have been extracted primarily because of periodontal disease. The status of remaining teeth should provide useful clues to the cause of loss of teeth, and questioning of a patient should be kept to a minimum, being used only where the examiner judges questioning to be essential.

A - Other absent

This category should be used for tooth spaces vacant for reasons other than caries, periodontal disease or normal exfoliation of a primary tooth. Specific purposes included will be trauma, removal as a part of orthodontic treatment and removal as a part of prosthetic treatment.

X - Excluded teeth

This score should be used for: -

1) Unerupted teeth
2) Primary teeth
3) Banded teeth

Treatment

0 - None

This code is used when it is considered that a tooth requires no treatment.

1 to 3 - Fillings and Crowns

Depending on the surface coverage of fillings or the need for a crown, these codes should be used to designate treatment required to

remove caries lesions (primary or secondary), to repair trauma, or replace unsatisfactory fillings, in consideration of both function and appearance. Discolouration of a tooth due to trauma or a pulp condition or an incomplete pulp extirpation may be a reason for a restoration.

Replacement of a filling or crown is adjudged necessary, in the absence of untreated caries. When there is one or more of:

i) A deficient margin which, in the examiner's judgement, or on the evidence of insertion of an explorer, or of deep staining, allows leakage at least to dentine.

ii) An overhanging margin of a dimension at least equal to the thickness of a standard precast crown.

iii) A deficient contact point between normally spaced teeth or a deficient marginal ridge allowing, or facilitating food impaction.

iv) A fracture or defect in a filling allowing leakage at least to dentine.

v) A discolouration or disharmony of shape or colour of an existing filling or crown.

4 or 5 - Pulp treatment or extraction due to caries

These scores are used when there is obvious pulp involvement or when more than 2/3 of tooth structure has been lost. The examiner's clinical judgement must be relied upon to select which of these scores apply in individual cases.

N. B. Code 4 infers the need for pulp treatment plus a three surface filling or the need for a full crown with or without pulp treatment.

6 - Extraction due to periodontal disease

A tooth should be placed in this category when periodontal disease has advanced so far that the tooth is loose or functionless and, in the clinical judgement of the examiner cannot be restored to a firm and functional state.

7 - Extraction due to denture (prosthetic needs)

This category is used when so few teeth remain and there is such a poor distribution of remaining teeth that in the opinion of the examiner extraction as part of prosthetic care is the only possible treatment.

8 - Extraction due to other reasons

This score is used for teeth requiring extraction for orthodontic reasons in particular or for any other reasons not covered in scores 5, 6, and 7.

9 - Other

This score is used for any other treatment of teeth not covered by scores 1 to 8 and specifically for recontouring and repairing restorations.

N. B. Various types of treatment requirements may modify decisions on others. For example, the four remaining lower incisors in an otherwise edentulous mouth which are to be extracted for prosthetic reasons should not be recorded for fillings or crowns which might otherwise be necessary. Such interrelations can be defined in the field of malocclusion, caries, periodontal disease and prosthetics.

Occlusal Determinations

Should the examiner have difficulty in determining the specific classes of malocclusion as defined by Angle, a technique is suggested which removes considerable subjectivity from the qualitative assessment of the occlusion. The following steps are suggested:

Vertical grease pencil lines are drawn on the buccal or labial surfaces of the following teeth in a general axial direction:

Lower first permanent molars

- from the tip of the mesio-buccal cusp.
- from the tip of the disto-buccal cusp.

Upper first permanent molars

- from the tip of the mesio-buccal cusp.

Molar Measurements

CLASS I - those cases where the line from the mesio-buccal cusp of the upper first permanent molar falls in between the lines drawn from the mesio-buccal cusp and the disto-buccal cusp of the lower first permanent molar.

Note that Angle defined his cut-off point between Class I, Class II and/or Class III as a distance of one-half cusp from the buccal groove of the lower first permanent molar.

CLASS II - those cases where the line from the mesio-buccal cusp of the upper first permanent molar coincides with or passes anteriorly the line from the mesio-buccal cusp of the lower first permanent molar.

CLASS III - those cases where the line from the mesio-buccal cusp of the upper first permanent molar coincides with/or passes posteriorly the line from the disto-buccal cusp of the lower first permanent molar.

Examiner should study Figure I.

SURVEY INSTRUMENTS

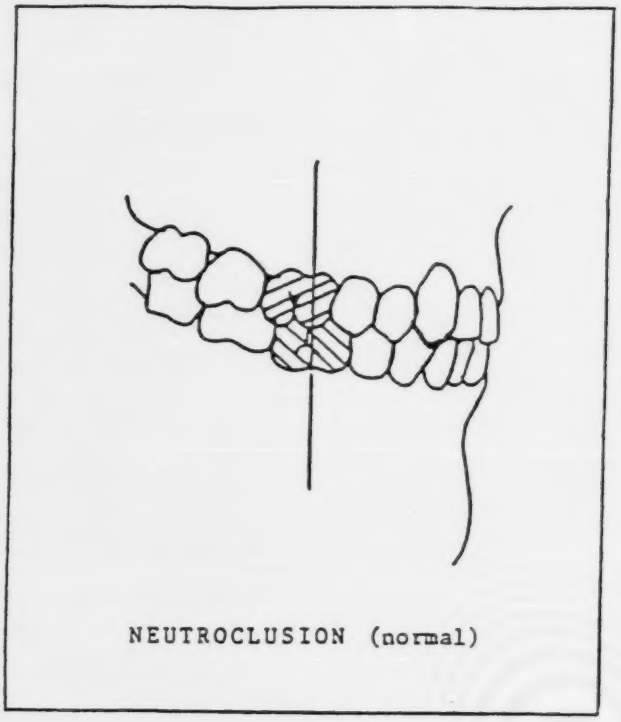
Contents

45 explorers, mirrors and probes sterilized in packages of 15 each. 5 individual packs each containing one mirror, explorer and probe.

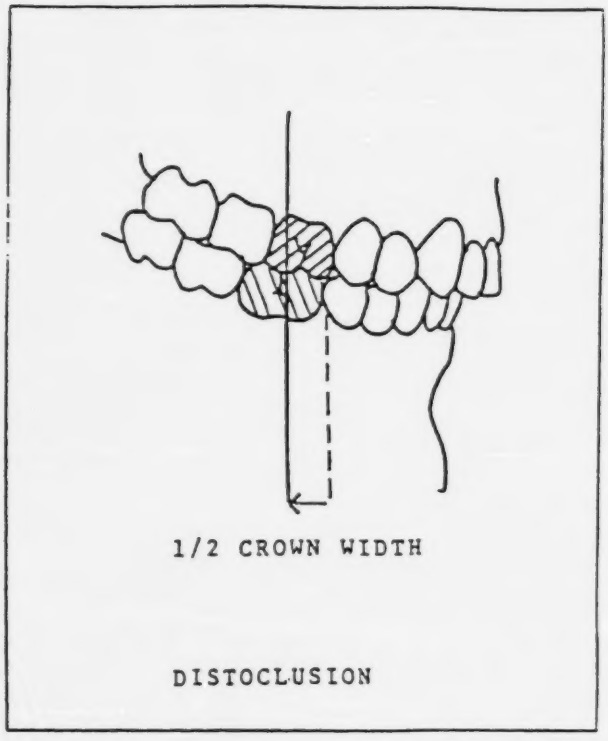
Explorer Rotation

Note that the explorers have been color-coded in groups of 15. this has ben done to ensure that all explorers are equally used throughout the study. It is anticipated that each team (i.e. one dentist plus one recorder) should be able to examine 30 children per day. The explorers could therefore be rotated, for example, as follows:

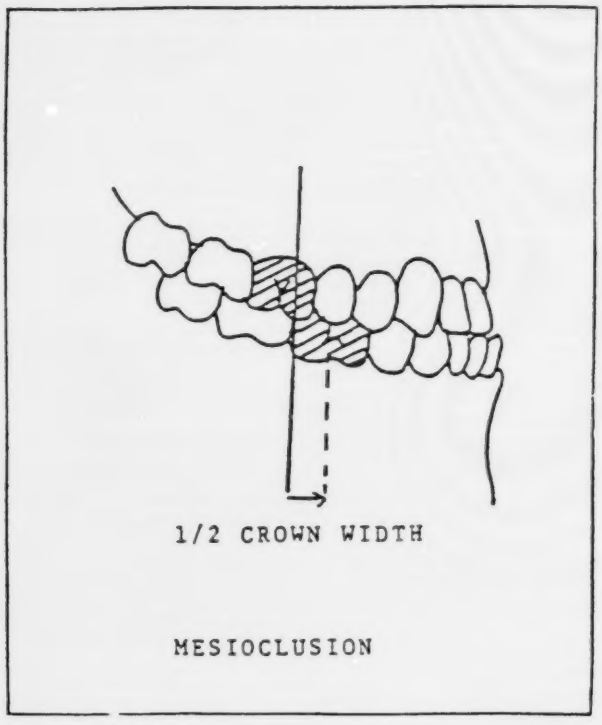
Day One - Yellow and Green
Day Two - Green and Orange
Day Three - Orange and Yellow
Repeat



NEUTROCLUSION (normal)



DISTOCLUSION



MESIOCLUSION

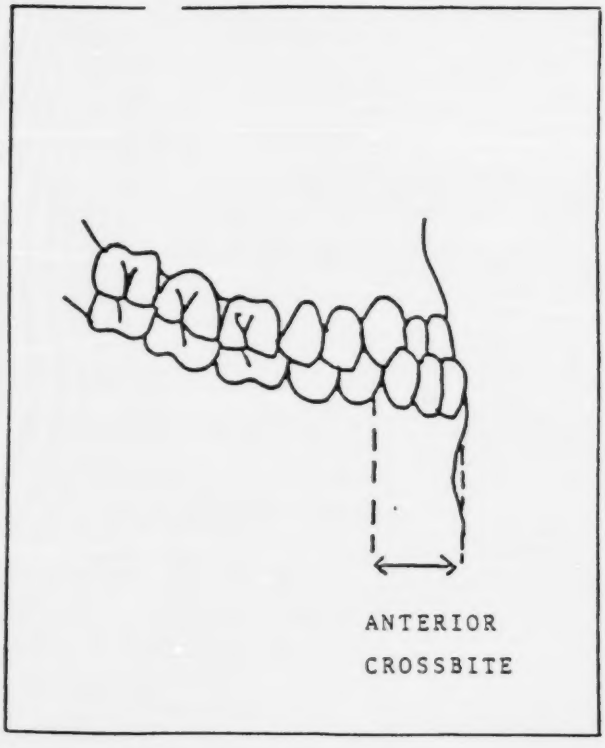


FIGURE I

The individual packs in which the explorer has not been color-coded are to take care of examinations in excess of 30 per day e.g. duplicate exams

Sterilizing Tips

When using plastic bags in the Dri-Clave do not allow the temperature to exceed 275°F, otherwise the bags will become brittle. Sterilization will occur when instruments are held at 275°F for 90 minutes. Wait until the oven has reached sterilizing temperature before timing the cycle.

APPENDIX C

Mother high school graduate

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	647	32.1	32.1	32.1
Yes	1	1,355	67.2	67.2	99.5
Don't know	9	11	.5	.5	100.0
	TOTAL	2,013	100.0	100.0	

Father high school graduate

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	802	39.8	39.8	39.8
Yes	1	1,197	59.5	59.5	99.3
Don't know	9	14	.7	.7	100.0
	TOTAL	2,013	100.0	100.0	

Mother university graduate

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	1,366	67.9	67.9	67.9
Yes	1	635	31.5	31.5	99.4
Don't know	9	12	.6	.6	100.0
	TOTAL	2,013	100.0	100.0	

Father university graduate

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	1,283	63.7	63.7	63.7
Yes	1	712	35.4	35.4	99.1
Don't Know	9	18	.9	.9	100.0
	TOTAL	2,013	100.0	100.0	

Number of times teeth brushed

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	0	170	8.4	8.4	8.4
	1	595	29.6	29.6	38.0
	2	859	42.7	42.7	80.7
	3	287	14.3	14.3	94.9
	4	88	4.4	4.4	99.3
	5	11	.5	.5	99.9
	6	1	.0	.0	99.9
	7	1	.0	.0	100.0
	9	1	.0	.0	100.0
	TOTAL	2,013	100.0	100.0	

Brush before breakfast

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	1,439	71.5	71.5	71.5
Yes	1	574	28.5	28.5	100.0
	TOTAL	2,013	100.0	100.0	

Brush after breakfast

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	514	25.5	25.5	25.5
Yes	1	1,204	59.8	59.8	85.3
No breakfast	2	295	14.7	14.7	100.0
	TOTAL	2,013	100.0	100.0	

Brush after lunch

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	1,776	88.2	88.2	88.2
Yes	1	237	11.8	11.8	100.0
	TOTAL	2,013	100.0	100.0	

Brush after dinner

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	1,598	79.4	79.4	79.4
Yes	1	415	20.6	20.6	100.0
	TOTAL	2,013	100.0	100.0	

Brush before bed

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	764	38.0	38.0	38.0
Yes	1	1,249	62.0	62.0	100.0
	TOTAL	2,013	100.0	100.0	

Fluoride toothpaste used

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	195	9.7	9.7	9.7
Yes	1	1,646	81.8	81.8	91.5
No toothpaste	2	16	.8	.8	92.3
Don't know	9	156	7.7	7.7	100.0
	TOTAL	2,013	100.0	100.0	

Toothpick used

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	1,648	81.9	81.9	81.9
Yes	1	345	17.1	17.1	99.0
Unknown	9	20	1.0	1.0	100.0
	TOTAL	2,013	100.0	100.0	

Dental floss used

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
No	0	1,663	82.6	82.6	82.6
Yes	1	337	16.7	16.7	99.4
Unknown	9	13	.6	.6	100.0
	TOTAL	2,013	100.0	100.0	

Number of visits to dentist

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
	0	604	30.0	30.0	30.0
	1	512	25.4	25.4	55.4
	2	407	20.2	20.2	75.7
	3	148	7.4	7.4	83.0
	4	87	4.3	4.3	87.3
	5	38	1.9	1.9	89.2
	6	31	1.5	1.5	90.8
	7	13	.6	.6	91.4
	8	25	1.2	1.2	92.6
	9	148	7.4	7.4	100.0
	TOTAL	2,013	100.0	100.0	